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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

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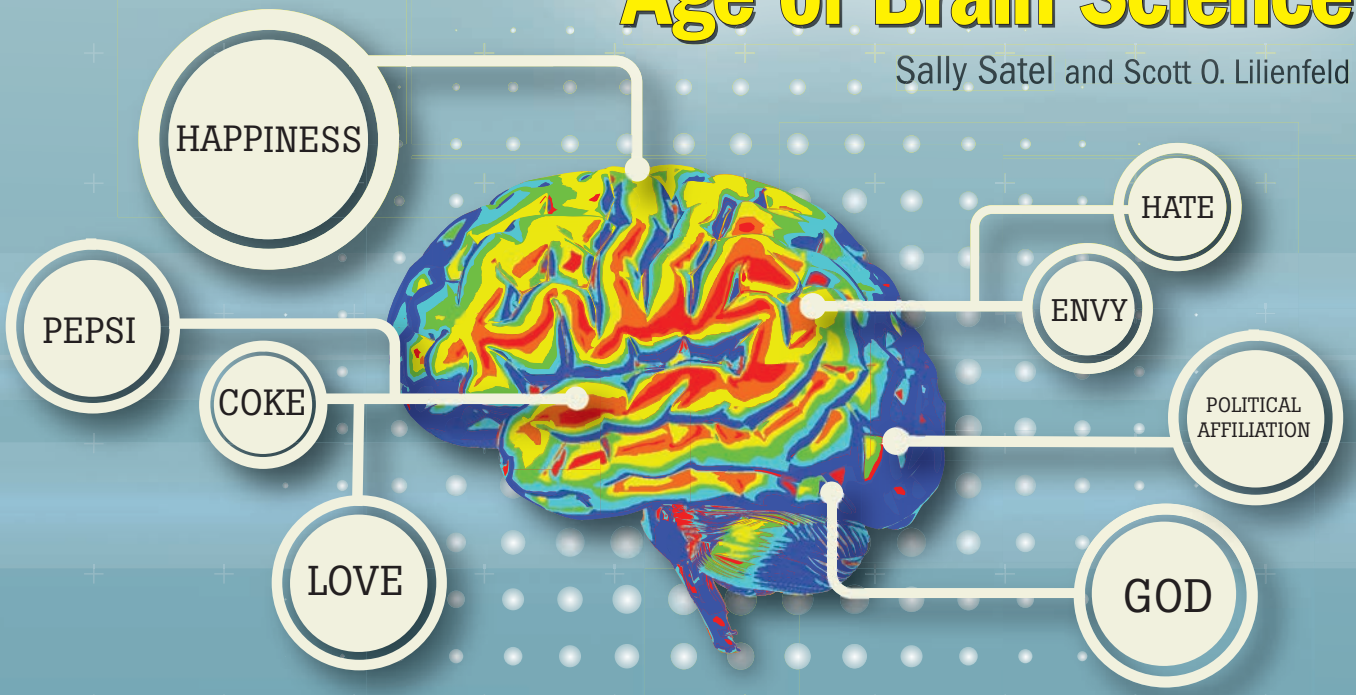
Losing Our Minds in the Age of Brain Science

Sally Satel and Scott O. Lilienfeld



Why Evolution Is Hard to Understand
Cameron Smith

Six Signs of Scientism, Part 1
Susan Haack

The Jersey Devil
Brian Regal

Valentich UFO Cold Case Solved
James McGaha and Joe Nickell

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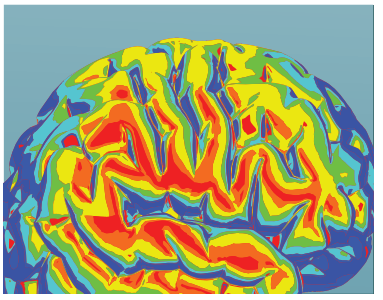

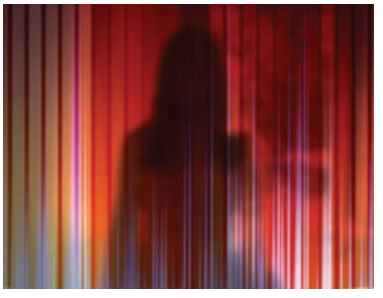

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Cautions and Enthusiasms

In their "Losing Our Minds in the Age of Brain Science," in this issue, Sally Satel and Scott O. Lilienfeld offer needed cautionary warnings about over-enthusiastic popular simplifications and exaggerations concerning modern neuroscience. The advent of powerful new brain imaging tools, particularly functional magnetic resonance imaging, is a remarkable intellectual advance. They acknowledge that. The brain now has a powerful cultural presence. But uncritical coverage and hype about the images and what they may mean have implied a promise of simply decoding its functionings. New stories pop up every day. Politicians, marketers, addiction researchers, law officials, defense attorneys—just about everyone now has a vested interest in making it seem this or that part of the brain explains our behavior and controls our lives. Misapplications and misrepresentations of modern neuroscience are perhaps an inevitable consequence of all this new knowledge, but it is well to remember that this new "neurocentrism" is not the be all and end all in understanding behavior; other levels of analysis are essential. And we should guard against overestimating, in the authors' words, "how much neuroscience can improve legal, clinical, and marketing practices, let alone inform social policy."

* * *

Philosopher and CSI Fellow Susan Haack of the University of Miami here presents the first of a two-part article, "Six Signs of Scientism," from her new book *Putting Philosophy to Work: Inquiry and Its Place in Culture*. As was obvious in her previous book, *Defending Science—Within Reason* (which we also excerpted), Haack is a well-informed friend of science, not an overt critic. As she says here, "Science is a good thing . . . but it is not a perfectly good thing," and we science enthusiasts should not over-reach toward an uncritically deferential attitude to what is, after all, a very human undertaking. I think her two-part article offers both lively intellectual substance and valuable cautionary advice.

* * *

I write shortly after participating in a successful 15th European Skeptics Congress in Stockholm, Sweden. This is the latest of a series of biennial conferences established by the European Council of Skeptical Organizations (ECSO). ECSO has been chaired for the past twelve years by our longtime colleague Amardeo Sarma of Germany, a member of our Committee for Skeptical Inquiry's Executive Council and a Skeptical Inquirer editorial board member. The Swedish Skeptics group, headed by Martin Rundkvist, ably hosted this lively conference, which was designed to allow fruitful networking among attendees. With 2,700 members, the group proudly notes that as a proportion of the country's population, it may be one of the world's largest skeptic groups. The enthusiasm of the young skeptics attending and contributing points to a bright future for science-based skeptical inquiry and the pursuit of knowledge about the real world.

—Kendrick Frazier

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The Fox News Effect: Media Use and Global Warming Denial

Kendrick Frazier

Anecdotal experience leads to the suspicion that those who oppose the findings of modern climate science tend to be avid consumers of certain conservative media outlets, especially Fox News and talk radio host Rush Limbaugh.

In case there was any doubt about that, a new communications research study demonstrates the connection. Specifically, it shows that using conservative media decreases one's trust in scientists. This in turn increases doubt that climate change and global warming are happening.

Communications researchers Jay D. Hmielowski of the University of Arizona, Lauren Feldman of American University, Teresa A. Myers and Edward Maibach of George Mason University, and Anthony Leiserowitz of Yale University have published an eighteen-page study in the journal *Public Understanding of Science* (DOI: 10.1177/0963662513480091).

A nationally representative group of respondents were multiply surveyed about their beliefs in climate change, risk perceptions, policy preferences, and related behaviors. A total of 2,497 respondents participated in the first wave of data collection in the fall of 2008. Of these respondents, 1,036 participated in a second wave in the spring of 2011.

Subjects were asked how often they watched Fox News and listened to *The Rush Limbaugh Show*. They were also asked about their use of nonconservative media sources known to align more closely with mainstream scientists' views on climate change: CNN, MSNBC, National Public Radio, and network news (ABC, CBS, and NBC). They were asked about their trust or distrust in scientists as a source of information about global warming and asked if they see themselves as liberal or conservative, very liberal or very conservative.

The study's findings are no surprise. The more Americans use the conservative media, the less certain they are that global warming is happening. Conversely, the more Americans use nonconservative media, the more certain they are that global warming is happening.

The study goes beyond previous studies in demonstrating a media effect on trust in scientists as the mediating variable between media use and perceptions of global warming. Greater use of conservative media was associated with lower trust in scientists.

Using conservative media decreases one's trust in scientists. This in turn increases doubt that climate change and global warming are happening.

The findings that global warming acceptance in the United States is aligned by which media outlets people watch is worrisome, the authors note. "This increasing fragmentation of audiences across diverse media outlets likely inhibits consensus-building on important issues." The findings also "help explain the widening partisan divisions in public opinion about global warming and trust in scientists. This political polarization is contributing to national climate policy paralysis in the USA. . . ."

The study notes that previous research has shown that conservative media create distrust in scientists in five main ways: 1) presenting contrarian scientists as "objective" experts and mainstream scientists as biased or self-interested; 2) denigrating scientific institutions and peer-reviewed journals; 3) equating peer-reviewed research with political opinion; 4) accusing climate scientists of manipulating data; and 5) characterizing climate science as a form of "orthodoxy" and doubters as brave dissenters.

John Abrahamand and Dana Nucci telli, in their online "Climate Consensus—The 97%" column hosted by *The Guardian*, note that the watchdog group Media Matters has provided examples of Fox News engaging in all five of these tactics. Abrahamand and Nuccitelli headlined their column about the Hmielowski et al. study: "Fox News found to be a major driving force behind global warming denial."

Hmielowski told the Skeptical Inquirer that although they didn't test the idea in their paper, they think a reinforcing process goes on. "Conservative media use will decrease trust in scientists. This decrease in trust leads to further use of conservative outlets such as Fox News. So, yes, the media affect attitudes. But people's attitudes are also driving people's media use."

* * *

There is some recent positive news on the climate science–perception front. A new poll by the Benenson Strategy Group carried out in July 2013 finds that an overwhelming majority of voters under age thirty-five understand the threat of climate change and already see the harmful effects of it. To these young voters, denying climate change signals a much broader failure of values and leadership, the poll found. Sixty-eight percent said they would be less likely to vote for a climate change denier, and that was true even for 48 percent of Republicans.

Kendrick Frazier is editor of the Skeptical Inquirer.

Researcher: PTSD in Ghosts a Public Health Concern

Douglas M. Stokes

The June 2013 issue of the *Australian Journal of Parapsychology* features an article by Dr. Wasney de Almeida Ferreira titled "Psychological Phenomena in Dead People: Post-Traumatic Stress Disorder in Murdered People and Its Consequences to Public Health."

Apparently post-traumatic stress disorder (PTSD) does not cease at death, especially among the murdered. How does Ferreira know this? Through strict scientific protocols involving directly interviewing the dead while in an induced state of astral projection. Ferreira's afterlife world resembles the physical world in that the deceased may still occupy houses that are facsimiles of the homes in which they dwelt prior to their demise. You can still be addicted to drugs such as cocaine and heroin even though you're dead. Ferreira notes that crack-addicted ghosts have black skin and yellow eyes in the afterlife. This characterization is unlikely to be favorably received by jaundiced persons of African descent. Hopefully, these hues will not lead to discrimination on the basis of dermal and ocular coloration. Shades that bear these shades should be treated fairly in the great job market to come (which I sincerely hope does not exist).

Ferreira notes that there are six basic conceptual metaphors in the health sciences to describe the human body: a 3D object, a machine, a factory, a topography, a fabric, and a vegetable. He relates two of these metaphors (topography and vegetable) to maritime expansion.

Ferreira notes that crack-addicted ghosts have black skin and yellow eyes in the afterlife.

Ferreira's article is accompanied by six commentaries (all of them negative to varying degrees) as well as an editorial disclaimer. However, even an infinite number of such rejoinders may not be sufficient to reverse the cognitive damage that may be incurred by an unwary reader of Ferreira's article.

I initially thought that in view of the danger to public health brought to our attention by Ferreira, it might be appropriate (as well as highly profitable) to establish a foundation to cheer up the murdered. However, I soon realized that, as Ferreira could provide therapy to these deceased persons, I would be ethically bound to hire him to provide such services. Thus, yet another fast buck eludes my grasp.

Douglas M. Stokes is a frequent contributor to the literature related to the parapsychology. His most recent book is *Reimagining the Soul* (to be published by McFarland & Co. in the fall of 2013).

Mysterious Moving Museum Statue: Ghost, Curse, or Physics?

Benjamin Radford

An ancient statue in a British museum unnerved many people when it was caught on camera turning in its locked display case in June 2013. According to an article in the *Manchester Evening News*,

> An ancient Egyptian statue has spooked museum bosses—after it mysteriously started to spin round in a display case. The 10-inch tall relic, which dates back to 1800 BC, was found in a mummy's tomb and has been at the Manchester Museum for 80 years. But in recent weeks, curators have been left scratching their heads after they kept finding it facing the wrong way. Experts decided to monitor the room on time-lapse video and were astonished to see it clearly show the statuette spinning 180 degrees—with nobody going near it.

What's going on? Because the piece is in a museum display about ancient Egypt, some have suggested a curse or ghost. It is certainly mysterious: If the video is to be believed (and there's little reason to doubt it), then the statue is indeed moving independently inside a closed case, untouched by human hands.

I was asked to investigate the mystery by Discovery News and found clues in the video that suggest another explanation. First, note that the video is a time-lapse covering about a week (not, as some news reports suggest, eleven hours). Though at first glance it seems to turn both day and night, a closer look reveals that it almost always turns when people are present. Second, contrary to descriptions of the statue as "spinning," it doesn't actually spin at all but instead rotates once about 180 degrees, or a half-turn. This also means it's turning very, very slowly.

The favored scientific explanation is simply that the statue is rotating in response to vibrations from museum visitors. Without closely examining the base of the statue it's impossible to know exactly what's going on, but the most likely explanation is that the base bulges out very slightly, creating a convex surface. It doesn't need to be obvious or even noticeable—just a millimeter or two of a protruding bump somewhere near the middle of the piece is enough. This is common in hand-crafted items such as those made of wood, stone, plaster, and other materials not cut to perfect right angles on modern machinery.

If this is the correct explanation—and it certainly seems far more likely than a ghost, a curse, or even a cursed ghost—then the phenomenon will stop because the statue has found its lowest center of gravity.

Usually this bump on the bottom remains unnoticed or is ignored. But in some rare cases, if the object is placed on a smooth surface with very little friction to hold it in place—and unless the glass case (and the floor underneath it) is perfectly level—the statue will turn. As with the bump on the bottom of the statue, the tilt does not need to be noticeable to be effective. The statue is housed in an ordinary glass museum case, not a laboratory platform scientifically calibrated to maintain perfect level and resist vibrations. This would also explain why the statue rotates on its axis, turning more or less in one spot instead of wandering around the display case like a lost child looking for its mummy.

The fact that the statue merely rotates half a turn is important because it conforms exactly to what we'd expect if it's simply shifting its weight in response to vibrations. If this is the correct explanation—and it certainly seems far more likely than a ghost, a curse, or even a cursed ghost—then the phenomenon will stop because the statue has found its lowest center of gravity. If the security camera catches the statue completing its turn back to its original position, then this explanation can be ruled out.

Though museum visitors are the most obvious source of vibrations, there are others, including those that occur after hours and at night including closing doors, traffic from a nearby road, and possibly even microtremors, which happen routinely around the world but are so slight that seismometers are needed to detect them.

Some have questioned the vibration explanation, asking why the other statues in the same display case don't rotate the same way. Perhaps their bases are either flat or concave, preventing the figures from rotating. But there's another clue: Close observers may notice something else different about the one moving statue as compared to its three stationary cousins: it is much taller. This means that the statue has a high center of gravity and thus is less stable than the others, if only slightly.

If the mysterious action truly is caused by a ghost, curse, or other supernatural phenomenon, it's pretty lame. In centuries past ancient curses used to be serious business, allegedly causing illnesses, accidents, and even violent deaths. These days they can't do more than rotate a statue a few centimeters each day.

Medals, Honors to Loftus, Morrison, Scott

The American Psychological Foundation has awarded its 2013 Gold Medal Award for Life Achievement in the Science of Psychology to psychologist **Elizabeth Loftus** for "extraordinary contributions to our understanding of memory during the past 40 years that are remarkable for their creativity and impact." The citation notes that Loftus "has been a pioneering scientist in the area of memory distortion and false memories. Her imaginative and rigorous research has had a profound impact on the field of psychology, on scholars outside the field, and on the administration of justice around the world." Loftus was also the subject of a laudatory feature article about her decades of work exposing flaws in eyewitness testimony in the August 14 *Nature* (volume 500, issue 7462). She is a Fellow and member of the Executive Council of the Committee for Skeptical Inquiry.

David Morrison has been awarded the NASA Exceptional Achievement Medal "for exceptional achievement in exposing the 2012 doomsday hoax and using science to reassure the public and overcome widespread fear of the end of the world." The award was given August 29. The nomination noted that Morrison was "the most outspoken scientist in NASA—perhaps in the world—using facts to fight the belief that the world would end on Dec. 21, 2012. . . . His efforts reinforce the role of scientists in reaching out to educate and reassure the public in the face of misinformation and pseudoscience. As a senior scientist at NASA Ames Research Center, Dr. Morrison has answered questions from the public submitted to NASA's 'Ask an Astrobiologist' website for the past decade." The award also praises four videos he made, his writings for the nasa.gov website, fact sheets, and other writings and presentations. "Dr. Morrison's spirited defense of reason in the face of widespread fear-mongering and his work to reassure frightened children and parents represents an exceptional achievement that reflects well on NASA and its mission of public outreach." Morrison is a Fellow of the Committee for Skeptical Inquiry and a Skeptical Inquirer contributing editor.

Eugenie C. Scott received an honorary doctorate, her ninth, from Chapman University in May in recognition of her "work . . . in advancing the public understanding and acceptance of evolution." Says the award citation: "Your career in defending the integrity of science education exemplifies a combination of scholarly rigor, civic concern, and tireless devotion. . . . Whereas evolution's tenacious defender Thomas Henry Huxley called himself Darwin's bulldog, you like to identify yourself with a different domesticated canine—one which the Kennel Club's breed standard describes as 'kindly, friendly, and confident.' We take tremendous pride in bestowing this honorary degree upon 'Darwin's golden retriever.'" Her commencement address to Chapman is published in the May/June 2013 *NCSE Reports*. She was introduced as "arguably the most effective defender of evolution education and the integrity of science education on the planet today." Scott, a physical anthropologist, is retiring by the end of this year as executive director of the National Center for Science Education. She is a Fellow and a member of the Executive Council of the Committee for Skeptical Inquiry.

After Spiritual Experiment Woman Decides She Needs to Eat

Benjamin Radford

A woman in Seattle who believes she can live on nothing more than air, sunlight, and water conducted a social and spiritual "experiment" in June 2013 to see if she really needed to eat food. According to a June 5 story on Fox News, "Navenna Shine, the founder and subject of the Living on Light experiment, plans to spend the next four to six months abstaining from food of any kind and living on only light, water and tea. According to her website Livingonlight.com, Shine started the experiment in an attempt to follow a group of obscure Yogis, who for thousands of years have claimed the ability to live on light."

The claimed ability to survive without food (and sometimes without water as well) is called inedia, and those who attempt it are called "inediates" (among other things). One common version of inedia includes a belief called breatharianism, which teaches that humans can be trained to survive just on water and sunlight.

Shine turned her experimental flirtation with starvation into something of a social media event, filming herself on web cams and creating a Facebook page so supporters (and detractors) could follow along. She seemed sincere in her effort, blogging about her symptoms including nausea, her conversations with God, and the messages she received from the universe as her body fought off delirium.

Though the experiment was planned to last four to six months, she ended her fast after about two weeks. According to *The Seattle Times*, "Shine had dropped to 126 pounds from her original weight of 159 pounds on her 5-foot, 4-inch frame. She says she's quitting . . . in part because she's run out of money, and in part because of the public reaction. 'I was just asking a question, but there was just so much negative response that that means the question can't even be asked,' she said. She also says that she didn't want to be responsible for others trying 'Living on Light' without having their 'belief systems lined up.'"

Navenna Shine ended her Living on Light experiment after just two weeks.

Shine turned her experimental flirtation with starvation into something of a social media event, filming herself on web cams and creating a Facebook page so supporters (and detractors) could follow along.

Shine seemed surprised and dismayed at the public reaction to her fasting experiment, framing it as a matter of striking a nerve of social and cultural taboos. The issue was not, as she put it, about anger over her exploration of alternative spiritualities or asking "questions [that] can't even be asked," but instead the humanitarian concern that she might starve to death during her misguided quest.

Still, the way in which she ended her potentially fatal fasting leaves some concerns. Shine did not stop because she changed her mind about the fact that people need to eat—indeed she remains convinced that it is possible, just not under the scrutiny of the world (and, oddly, with more money). By suggesting that ending the experiment was an altruistic public service or due to circumstances beyond her control, Shine was able to save face and keep her beliefs intact. ■

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Why We Do This: Revisiting the Higher Values of Skeptical Inquiry

I want to give some brief historical perspective about the skeptical movement, take a look at some new trends, and revisit a theme I've emphasized before, reminding ourselves why we do this: the higher values of skeptical inquiry.

Known somewhat affectionately throughout our first three decades as CSICOP, the Committee was founded on May 1, 1976, at a major conference on "The New Irrationalisms" called by philosophy professor Paul Kurtz at the State University of New York at Buffalo. It was the first organized effort by scientists, scholars, and investigators from all relevant fields of intellectual inquiry, worldwide, to unite in exploring and combatting credulous belief in pseudoscientific and paranormal claims.

This, some of you may recall, was an era of rampant belief in astrology ("the Age of Aquarius"), Velikovsky and his planetary pinballs, von Däniken and ancient astronauts, birthdate-based biorhythms, the supposed Bermuda Triangle, pyramid power, and copious other unexamined nonsense. Uri Geller was everywhere bending cutlery and fooling even some physicists into thinking he had supernormal powers.

I covered that conference as editor of *Science News* magazine and the next year was invited to become editor of CSICOP's journal, the Skeptical Inquirer. It has been my honor to have been its editor ever since.

On our thirtieth anniversary in 2006, Paul Kurtz himself did a major retrospective review of the committee and the Skeptical Inquirer (SI, September/October 2006). At the time of our founding, Kurtz recalled, "There was tremendous public fascination" with the paranormal and it was "heavily promoted and sensationalized by an often irresponsible media." (I leave it to you to decide whether those conditions now differ.) "Our interest," Kurtz stressed, "was not simply in the paranormal curiosity shop but to increase an understanding of how science works."

We thus appealed to scientists and scholars to engage with the public not only in investigating popular claims that involved misunderstandings of science but in explicating the higher values of science and critical inquiry.

That broad spectrum of interest and emphasis still typifies us and most of the skeptical movement today. We skeptics do it all, investigating the smallest strange mysteries that fascinate the public while also explaining the powerful tools of science and reason and applying them to thinking about the broadest issues of concern and confusion in today's complex societies.

Just as science is internationalist and scientific principles know no boundaries, the misrepresentations of science that concern us observe no national borders. It was fitting therefore that Paul Kurtz (who died a year ago, on October 20, 2012, at the age of eighty-six) always advanced an internationalist perspective. Kurtz was an international ambassador for skepticism and humanism and free and open critical inquiry. He tirelessly traveled the world and encouraged skeptics everywhere to organize their own groups. They did. In his retrospective he expressed "great satisfaction that the Skeptical Inquirer is read throughout the world and that CSICOP has helped generate new skeptics groups, magazines, newsletters almost everywhere—from Australia and China to Argentina, Peru, Mexico, and Nigeria; from Indian, Eastern Europe, and Russia to Germany, France, Spain, Italy, and the United Kingdom, so that the Center for Inquiry/Transnational (including CSICOP) has become truly planetary in scope." More nations can now be added to that list. We can of course debate to what degree this encouragement led to the flowering of new groups and to what degree they flowered on their own.

In his later years, Kurtz convinced himself—but few others—that interest in the paranormal had diminished. "No one is interested in the paranormal anymore," he would proclaim. We would either demur or just smile. What had happened, I think, was twofold: First, *his* interest in the paranormal and pseudoscience had diminished, and he was now devoting most of his energy to bringing his profound vision of a positive, affirmative secular humanism informed by the findings of science to broader arenas of public relevance. In a way, I sympathized with him; many of our academic colleagues blanched at even a semantic connection to anything paranormal—I didn't like it much myself. In fact in September 2006 we on the CSICOP Executive Council took "paranormal" out of the name and mission statement of our Committee for the Scientific Investigation of Claims of the Paranormal, shortening the name to just Committee for Skeptical Inquiry—and unfortunately almost losing the acronym, and brand, CSICOP.

But second, the rise of the Internet and the proliferation of new cable and

satellite television channels by the hundreds brought an insatiable demand for new programming with mass appeal. Paranormal themes eagerly helped fill the need. Paranormal programming wasn't visible in quite the same classic way via books and newspapers and network TV that worried us before; it appeared now on smaller stages, but the stages had multiplied geometrically. Nowadays you can't channel hop without encountering ridiculous pseudoscientific shows touting haunted houses and ghost-hunting, searching for monsters, mystery-mongering about supposed aliens and UFOs, or showing so-called psychics pretending to find missing persons or communicate with the dead. It'd be amusing if it wasn't so sad. Interest in the paranormal hasn't diminished at all. It just fragmented and proliferated. It is everywhere.

Conspiratorial thinking is a way of not thinking. It is a pernicious way of shaping a preconceived personal worldview so that it is immune from criticism.

So psychics, UFOs, monsters, and their ilk continue to pop up like the unsinkable rubber ducks they are. But there have been some new themes since we began. Back then, "alternative and complementary medicine" didn't even exist, at least not as a respectable-sounding term. We called it quackery or snake oil. Or bad medicine. Now it has become all polite and gentrified, and our medical schools and research institutes, funded publicly, give nods of obeisance to it, providing undeserved respectability.

Let's at least adopt our colleague Dr. Harriet Hall's term "So-Called Alternative and Complementary Medicine" with its acronym "SCAM" or just follow the clear advice of Dr. Paul Offit, in his fine new book *Do You Believe in Magic?* : "The truth is, there is no such thing as conventional or alternative or complementary or integrative or holistic medicine. There's only medicine that works and medicine that doesn't."

But this "medicine that doesn't work" has become an enormous industry that requires continuing critical examination. Thankfully many physicians have become active in the skeptical community, even leaders (many of them associated with CSI), and their barrages of critiques are now putting some needed skeptical balance and perspective on the matter.

Another new theme: conspiracy theories. Conspiracy thinking has always been around but not in the endemic way in which it now pollutes almost every aspect of public discourse. Conspiracies about what? Just about everything.

Distrust in government and all public institutions *is* at high levels, not without some reason, but conspiratorial thinking is *not* just due to that. It is a way of not thinking. It is a pernicious way of shaping a preconceived personal worldview so that it is immune from criticism. Absence of evidence for the theory is perceived as evidence *of* the conspiracy (to withhold the evidence). That is not critical thinking. That is the opposite of critical thinking. (And yes, we all know there are real conspiracies in the world; critical thinking is required to separate them from imagined ones.)

The new challenge to scientific skepticism I found most surprising was opposition to climate science. Climate scientists' findings that the Earth is warming and that that this warming is likely to continue due to the steady increase of greenhouse gases seems to most of us straightforward science. But, as you know, the conclusions have engendered passionate opposition, even denial, in some quarters. Because of this gap between scientific evidence and public perception, we've been involved with this topic in the Skeptical Inquirer since 2007. This topic differs from the others because a few of our fellow skeptics are among the critics of climate science. No science is perfect, especially a young science like climatology, but its findings are far more robust than its critics want to admit. We have tried to be respectful of those skeptic colleagues who honestly question the findings of climate science; they think, I am sure, that they are being good skeptics. (In this case I'd prefer to call them contrarians.) But I believe they are seeing the science through their own ideological filters. . . and that can be dangerous. Especially so when in so many nonscientific forums they seem to trust the science is being denigrated and distorted and opposition to it is being encouraged by some of the same powerful political propaganda machines that have supported the tobacco lobby in the past and continue to fund creationists today.

Another new strand is apocalyptic thinking. Whether global contagions, environmental collapse, collisions with nonexistent rogue planets, alien invasions, or zombies, something ends our world and civilization. Perhaps this is a subset of conspiracy thinking. In any event it is endemic in our popular culture at the moment, and I worry, just a bit anyway, about the effect on young people growing up with the idea, formerly confined mostly to religious zealots, that the world has no future.

So those are some new current strands to go along with the old, perennial ones that constantly crop up using new terms and new disguises, as when "Intelligent Design" tried (ultimately unsuccessfully) to replace old-fashioned creationism or "anomalous cognition" was proffered for claims of psychic powers.

But again, our interest has never been just debunking the paranormal or exposing the delusions of its promoters and followers. Instead it is to encourage an appreciation for the scientific outlook, with its innate initial open-minded skepticism toward new claims to knowledge, its creative tools for teasing out the truths about nature,

and its reliance on high-quality evidence and informed peer criticism in assessing the results.

Some of these larger topics and issues, as I wrote when announcing our new Committee for Skeptical Inquiry name (SI, January/February 2007), include:

> …how our beliefs in such things arise, how our minds work to deceive us, how we think, how our critical thinking capabilities can be improved, what are the answers to certain uninvestigated mysteries, what damage is caused by uncritical acceptance of untested claims, how critical attitudes and scientific thinking can be better taught, how good science can be encouraged and bad science exposed, and on and on.

As for SI and CSI, Kurtz always encouraged these efforts to broaden our scope and apply the tools of scientific inquiry to newly emerging issues where there is public confusion and where the tools of evidence-based skepticism and critical thinking can be of service. As he said, "We originally criticized pseudoscientific, paranormal claims because we thought that they trivialized and distorted the meaning of genuine science." (That was my concern as well.) But, he continued, "Many of the attacks on the integrity and independence of science today come from powerful political-theological-moral doctrines."

Likewise, as I have written in a Skeptical Inquirer essay, "In Defense of the Higher Values" (July/August 2006), the new areas we are concerned about "arise from deep-seated ideologies. They arise from a dangerous capturing of mainstream, liberal, open-minded religious viewpoints by those with far more extreme, narrow, rigid, authoritarian religious viewpoints. They arise from a devoted determination to impose those viewpoints on everyone else." (Both Kurtz's SI essay I've been referring to and mine are reprinted in our latest SI anthology, *Science Under Siege*, Prometheus Books, 2009.)

These attacks are on the open-minded tolerance of others different from oneself; on education and the love of learning and the quest for new knowledge; on a free and open society's distrust of dogma and authority; on freedom of expression and a clear separation of church and state; on the basic rights of women to make their own choices; and on a deep appreciation of education as a progressive force for enlightenment and improvement.

What we science-minded skeptics are defending here goes way beyond any of the specific bizarre ideas, trumped-up mysteries, or misperceptions or misrepresentations of the real world we may critique. What we are defending are hard-won concepts essential to a free and open society.

So what we science-minded skeptics are defending here goes way beyond any of the specific bizarre ideas, trumped-up mysteries, or misperceptions or misrepresentations of the real world we may critique. What we are defending, I have written before and I reiterate here, are hard-won concepts essential to a free and open society—if that society is to have well-informed citizens capable of making wise decisions in a complex technological world. Among them:

- Reason and rationality.
- Respect for the scientific outlook.
- The skeptical attitude, a key component of scientific thinking, with its obligations to put all new assertions to tests of empirical evidence.
- The traditions of learning—real learning, deep and broad, and unfettered.
- The deepest traditions of democracy—valuing individual freedom, human dignity, and rights and treasuring the free and open interplay of ideas.

So when we get tired, or discouraged, take heart that our travail has purpose and meaning. And we can draw inspiration from others facing challenges far beyond ours. Consider the courageous example of Malala Yousafzai. Malala is the sixteen-year-old Pakistani girl who was shot in the head last year by the Taliban for advocating the education of girls.

At the United Nations in July, Malala said she is not against anyone, she is *for* "the education of girls and boys, especially the children of the Taliban."

"The extremists are afraid of books and pens," she said. "The power of education frightens them. . . .The power of the voice of women frightens them. . . . Let us wage a global struggle against illiteracy, poverty, and terrorism and let us pick up our books and pens. They are our most powerful weapons."

I am not suggesting that skeptics plunge into these kinds of life-and-death situations. (Some do, like Malala, and have paid a big price, witness the August 20 murder of Indian rationalist and skeptic Dr. Naredra Dabholkar.) My point is that skepticism, and its advocacy of learning and critical thought, exists along a continuum that includes crucially meaningful matters.

If this sixteen-year-old can endure and enlighten and inspire on the world stage, we can forge ahead with our efforts to bring a modicum of reason and rationality to a modern world still fighting ancient strands of ignorance and intolerance. ■

Kendrick Frazier is editor of the Skeptical Inquirer and a Fellow and member of the Executive Council of the Committee for Skeptical Inquiry. He received CSICOP's In Praise of Reason award in 2001. This commentary is based on remarks delivered at the 15th European Skeptics Congress, Stockholm, Sweden, August 22–25, 2013.

[INVESTIGATIVE FILES JOE NICKELL

Joe Nickell has been a Pinkerton operative, a literary detective (PhD in English literature and folklore), and occasional police homicide consultant. Still later (1995) he became the world's only full-time professional paranormal investigator. He is coauthor of the forensic textbook *Crime Science* (Nickell and Fischer 1999), and his work has been cited in such texts as *Kirk's Fire Investigation.*

Detective: Uncovering the Mysteries of a Word

As a literary detective (my PhD dissertation was *Literary Investigation* [Nickell 1987]), I have applied linguistic evidence to famous cases—showing, as spurious, for example, the infamous Beale treasure papers (Nickell 1982) and the alleged diary of Jack the Ripper (Nickell 1993), among others. More recently, I have been investigating another questioned text, purportedly penned in the American South in 1846 but describing events of decades earlier. The story involved "detectives," but that word had not yet come into existence, a revealing fact that soon drew me into further studies. Here is some of what I found.

Early Detection

Among the earliest detective stories in literature is one related in an extra, apocryphal Book of Daniel (given in Catholic Bibles as Daniel 14:1–21). It tells how, during the reign of Cyrus, the Babylonians persuaded the Persian King to worship their idol Bel (or Baal). Set up in a temple, the effigy daily consumed twelve bushels of flour, forty sheep, and fifty gallons of wine that the priests placed before it. Or so it seemed.

A suspicious Daniel, however, in detective fashion, set a trap to reveal possible trickery. He had ashes scattered

Eugène François Vidocq

over the floor of the temple before it was sealed. The ashes subsequently revealed the unmistakable footprints of men, women, and children who had entered through secret doors. Mystery solved.

The centuries, however, awaited a term for such a person as Daniel. There was the sixteenth-century word *investigator* of course (from the Latin), describing one who made diligent inquiry or examination, but without necessarily meaning to skillfully *detect*—from the Latin *detegere*, to uncover. Eventually there came *detector* (or *detecter*), one who simply revealed, like an accuser or informer (*OED* 1971, 704, 1478). By 1605, Shakespeare was using that term to describe one who finds the artfully concealed or the inherently obscure: "O Heavens! That this Treason were not; or not I the detector!" (*King Lear* III. v. 14).[1] Indeed, *detecter* [sic] is the very word given for such a meaning in Dr. Samuel Johnson's famously "first"[2] English dictionary (1755): "DETÉCTER. *n.s.* A discoverer. *Shakespeare*."

The First Detective

In time, detection became a new profession, although more time would elapse before a word evolved to describe one who practiced it. Such a person was Eugène François Vidocq (1775–1857) who has been called "the first detective" (Morton 2012). He rose from petty criminal to police informer to undercover operative, to the founder of the French Sûreté Nationale in 1811. He is also credited with creating the first private detective agency. Vidocq published his ghost-written memoirs in 1829, popularizing the proverb "set a thief to catch a thief" (Morton 2012).

Vidocq's memoirs were among the most sensational crime-chasing stories of the period, and French writers began to base characters on him. Honoré de Balzac's *Le Père Goriot* (1834) featured an anti-hero Vautran who was modeled

after Vidocq. Later, Victor Hugo's *Les Miserables* (1862) contained two such characters (convict-hero Jean Valjean and Inspector Javert).

Poe and the Detective Story

Meanwhile, the great American literary genius Edgar Allan Poe (1809–1849) created the genre of detective fiction with three stories. The first, "The Murders in the Rue Morgue" (1841), relates the horrific murders of a reputed fortuneteller and her daughter in a locked-room mystery that baffles the Parisian police. In the tale, Poe specifically acknowledges his debt to Vidocq. This pioneering story was followed by "The Mystery of Marie Rogêt" (1842–1843), based on a real, murdered American girl named Mary Rogers (Nickell 2010). Finally, he published "The Purloined Letter" (1842–1843), a tale of hiding in plain sight.

Poe's amateur detective, Monsieur C. Auguste Dupin, was the coldly logical hero of what Poe called his ratiocinative tales (*Benet's* 1987, 283). He did not call them "detective" stories; neither did he apply the word to Dupin or use it in any of his stories.

The word *detective* first appeared in print as an adjective. *The Oxford English Dictionary*[3] (*OED* 1971, 704) shows "detective police" in use in London as early as 1843, but it has since been shown that that term appeared earlier, in a letter to *The Times* (London), May 30, 1840. Some think therefore that *detective* was available to Poe but that he may have declined to use it (Berch 2010).

In fact, it is not only unlikely that Poe would have seen an obscure letter to the editor across the Atlantic, but the *adjective* form of the word did not give rise to the *noun* for years to come. (The suffix *–ive* is often added to a verb—in this case *detect*—to form an adjective meaning "to have the quality of"; subsequently such adjectives may evolve into nouns.)

The Pinkertons

The next major developments in detective matters are credited to Allan Pinkerton (1819–1884) who would firmly secure *detective* as a noun, and begin to apply adjectives to it. A Scottish fugitive (he had been a radical Chartist), he stole away with his bride to America, settling in Illinois and plying his trade as a cooper. In 1847, needing wood for his barrels and seeking it on a lush island in the Fox River, he soon spied evidence of clandestine activity. He lay in wait there one moonlit evening and, after a repeat stakeout accompanied by the sheriff, helped arrest a gang of counterfeiters (Horan 1967, 2–16).

Finding he was a born detective, Pinkerton became, in turn, deputy sheriff of Kane County, then in about 1849 Chicago's first detective, during which work he survived an initial attempt on his life. As the *Daily Democratic Press* reported: the shot was "discharged so near that Mr. Pinkerton's coat was put on fire." Two slugs in his arm were later "cut out by a surgeon together with pieces of his coat." After a year, Pinkerton resigned because of "political influence," but he soon had another badge. As Special United States Mail Agent he went undercover to solve a series of mail thefts and robberies. Later, in 1853, the *Daily Democratic Press* reported[4]: "As a detective, Mr. Pinkerton has no superior, and we doubt if he has an equal in this country" (Horan 1967, 18–24, 129, 171–172).

Possibly as early as 1850, Pinkerton founded what eventually became Pinkerton's National Detective Agency. Its letterhead pictured an open eye with the slogan, "We Never Sleep"—a trademark that gave rise to the term *private eye*. Pinkertons tended to be called "operatives" rather than "detectives." They were instructed in the arts of "shadowing," role-playing, and disguise (Horan 1967, x, 28–29).

Allan Pinkerton led the fight against bank, express-company, and train robbers. He foiled an assassination plot against president-elect Lincoln, and headed the Intelligence Service during the Civil War. His agents became spies, posing as confederate soldiers and rebel sympathizers. Subsequently, with sons William and Robert, Allan Pinkerton multiplied branch offices to create, at its height, the largest private detective agency in the world. Operative Frank Dimaio was the first detective to infiltrate the Mafia, among countless other Pinkerton successes (Horan 1967, 418–452).

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Not all Pinkerton activities were praiseworthy, however—the most contrary example being the use of operatives and watchmen against the labor movement. As James Horan states (1967, 358), "That the Pinkertons were acting within the law is incontrovertible; that they were acting morally is another question"—a fact they be-

latedly recognized. (When I became a Pinkerton detective in 1973, the agency had a long-established policy against strikebreaking or even reporting on lawful union activities.)

First Woman Detective

The Pinkertons' deplorable anti-union activities were heavily ironic in light of Allan Pinkerton's own equalitarian principles. As a Chartist he had promoted universal suffrage, and he was a fierce abolitionist and Underground Railroad activist (Horan 1967, 39–42). Much is revealed about Pinkerton's character by the story of a young lady of about twenty-three who appeared at his Chicago office one afternoon in 1856.

She introduced herself as Mrs. Kate Warne, a widow, and she wished Mr. Pinkerton to employ her as a detective. Pinkerton had never known of a female in that capacity, but he asked how she expected to be of value.

Warne explained in careful detail how she could "worm out secrets in many places to which it was impossible for male detectives to gain access." Pinkerton thought about it overnight and the next day hired the first career woman detective in America, if not the world. (By 1860, Pinkerton's "Female Detective Bureau" was headed by Kate Warne.) As one of a team of operatives assigned to an Adams Express Company robbery, Warne went undercover, adopting a suitable persona, and gained the confidence of the suspect's wife. When the woman asked Warne's advice about giving the stolen money for safekeeping to a man her husband knew only from jail (another Pinkerton!), Warne knew just how to advise her.

Warne was also integral to thwarting the "Baltimore Plot"—a conspiracy to assassinate President-elect Lincoln in 1861 as he was en route to Washington. It was her job to book seats in a special train's sleeper car "for a sick friend and party." After Pinkertons slipped Lincoln on board, an American Telegraph Company wire climber cut all lines out of Harrisburg, so other conspirators could not be alerted. While additional Pinkertons were positioned along the route to flash secret "clear-ahead" signals, Kate Warne "carefully drew the curtains and charmed the curious conductor" (Horan 1967, 52–61, 57).

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When Pinkerton—alias "Major E. J. Allen"—organized the Union Army's Secret Service Department (forerunner of the later civilian U.S. Secret Service), he summoned his best operatives, including Warne. She was soon involved in intelligence operations on behalf of her country, for example deftly penetrating social gatherings in the South. After the war, sadly, she grew ill, and, following a long struggle, died in her sleep in the early morning of January 1, 1868, at the age of only thirty-five, with Allan Pinkerton at her bedside (Horan 1967, 46, 81). He would later call her "the greatest female detective who ever brought a case to a successful conclusion" (qtd. in Horan 1967, 520).

Detective Fiction

Pinkerton's first female private detectives were far ahead of their time. Women did not join police departments until 1891 and then were only matrons, limited to caring for prisoners. New York City did not begin using women investigators until 1903. However, women writing detective fiction were early pioneers of the genre.

The first detective novel by either sex was by Emile Gaboriau: his *L'Affaire Lerouge* (1866) introduced Monsieur Lecoq, the next brilliant detective after Poe's Dupin, and with him, another major precursor to Sherlock Holmes. Holmes became the world's first "private consulting detective" in fiction with the publication of A. Conan Doyle's novel *A Study in Scarlet* (1887), and he remains the world's most famous fictional detective (*Benet's* 1987, 457, 557).

Meanwhile, in the United States, Anna Katharine Green of Buffalo (1846–1935) penned *The Leavenworth Case* (1878), making her the first detective novelist in America and the first woman to publish a detective novel anywhere in the world, in any language. Green followed it with many others. She paved the way for numerous other female detective-fiction writers, like England's Agatha Christie (1890–1976), who created such idiosyncratic sleuths as Hercule Poirot and Miss Jane Marple (*Benet's* 1987, 185).

It remained for American writer Dashiell Hammett (1894–1961) to become "the acknowledged founder of hard-boiled fiction" (*Benet's* 1987, 421). One of the finest examples of the genre, introducing his tough-guy private eye, Sam Spade, was *The Maltese Falcon* (1930). That and other Hammett novels—like *The Glass Key* (1931) and *The Thin Man* (1932)—became

popular Hollywood movies. Significantly, Hammett was a former Pinkerton operative, a fact that lay just below the surface of some stories.

Modern Developments

Between real-life detectives (official and private) and fictional ones, there has been a wonderful reciprocity—one often influencing the other. Nowhere is this better illustrated than in the evolution of a type of "scientific detective" or *criminalist*. It has been said that "the prototype of today's criminalist was fictional," namely Sherlock Holmes. When he appeared in 1887, scientific crime detection was in its infancy, yet Holmes was portrayed—not as a mere armchair theorist like Poe's Dupin, but as one who visited the scene of a crime and searched for and examined trace evidence.

As far as is known, the first real-life criminalist, Austrian lawyer Hans Gross (1847–1915), never read the Sherlock Holmes stories. But his pioneering textbook *Handbuch fur Untersuchungsrichter* ("manual for examining magistrates") seemed to bring the fictional ideas to life. In a typical sentence that might have come from a Holmes story, Gross wrote, "Dirt on shoes can often tell us more about where the wearer of those shoes had last been than toilsome inquiries."

A French disciple of Gross pointed to the interaction between real and fictional detectives. Edmond Locard (1877–1966)—who created the world's first real crime lab in 1920—stated, "I must confess that if in the police laboratory of Lyons we are interested in this problem of dust it is because of having absorbed the ideas formed in Gross and Conan Doyle." Locard, educated in both medicine and the law, set forth his famous concept known as Locard's Exchange Principle. It states that a cross-transfer of evidence takes place whenever a criminal comes in contact with a victim, an object, or a crime scene. For example, a perpetrator may unknowingly leave behind a strand of hair and a latent fingerprint, while inadvertently carrying from the scene distinctive carpet fibers or other identifiable debris (Nickell and Fischer 1999, 9–12).

In America, a government Bureau of Investigation created in 1908 was reorganized by J. Edgar Hoover in 1924 when a national fingerprint file was created. The official United States Crime Laboratory was established at the bureau in 1930, and in 1935 the bureau adopted the name Federal Bureau of Investigation (FBI). Here, too, we see developments that have their roots in earlier bureaus. Horan (1967, 49–50) observes that Allan Pinkerton had maintained an extensive Rogues' Gallery, "devising the earliest central clearing headquarters for the distribution of photographs of criminals, as well as pertinent information about them and their *modus operandi* to state, local, and government enforcement agencies." Indeed, "It operated in a manner similar to that of today's Federal Bureau of Criminal Identification."

* * *

Having tracked *detective* from its original form as an adjective to the noun it has also become, we have watched it gather adjectives of its own: *private*, *fictional*, *female*, *scientific*, and so on. I became a *paranormal* detective in 1969 and made that a unique career in 1995.

Detective will doubtless go in new directions. Before the nineteenth century had ended (according to the *OED* 1974, 204), it had already spawned *detectiveship* ("the office or function of a detective") in 1877, *detectivist* ("one who professedly treats of detectives") in 1892, and *detectivism* ("the activities of a detective, detective work") in 1894. The Internet shows rare, scattered uses of *detectivology* (the study of all things detective) as early as 1943, and, by extension, I suggest *detectivologist* to apply to one who writes a study such as this. No doubt the future will be as rich as the past.

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Notes

1. That term could also later mean a device that detects, such as a lie detector.

2. Earlier English dictionaries were compiled, but Johnson's was a far greater work (Winchester 1998, 84–88, 89–99).

3. For the fascinating story of the *OED*, see Winchester 1998.

4. Issue of September 9, 1853. This is earlier than the OED's date of 1856 for the noun *detective*.

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[THINKING ABOUT SCIENCE MASSIMO PIGLIUCCI

Massimo Pigliucci is professor of philosophy at the City University of New York, a Fellow of the American Association for the Advancement of Science, and coeditor (with Maarten Boudry) most recently of *Philosophy of Pseudoscience: Reconsidering the Demarcation Problem*. His essays can be found at rationallyspeaking.org.

Truth, Part II

We have seen ("Truth, Part I," September/October 2013) that the standard philosophical account of truth is the so-called correspondence theory of truth (CToT), which is usually assumed by practicing scientists (and, I bet, by most skeptics). It says that truth consists in a correspondence between one's statement and the way the world actually is. We have also seen that this is far more problematic than one might think, for a variety of reasons having to do with epistemology—the study of how we know what we think we know.

Another way to take the measure of the CToT is to look at some of its principal rivals, as they have been put forth in the philosophical literature during the past several decades. One such rival is a coherentist approach to truth, which replaces the idea of correspondence (with facts) with the idea of coherence (among propositions). This move works well, I suspect, for logic and mathematics but not really for scientific theories. There are simply too many possible theories about the world that are coherent and yet do not actually describe the world as it is.

A different set of alternatives to the CToT is constituted by a number of pragmatic theories of truth, put forth by philosophers like Charles Sanders Peirce and William James. Famously, however, these two differed significantly in how they looked at truth. For Peirce, scientific investigation converges on the truth because our imperfect sensations are constrained by the real world out there, which leads to a sufficiently robust sense of "reality" while at the same time maintaining skepticism about specific empirical findings and theoretical constructs. For Peirce, truth is an "opinion" that is destined to be agreed upon (eventually) by all rational inquirers, and the reason for this agreement is that the object of such opinion is reality. This is actually something that I think scientists and skeptics can definitely live with.

Famously, Bertrand Russell said that William James's theory of truth committed him to the "truth" that Santa Claus exists, and I am inclined to go with Bertie on this one.

By contrast, I find James's views irritatingly close to incoherence, or at least wishful thinking, as when he claims that truth is whatever proves to be good to believe, or when he defines truth as whatever is instrumental to our goals. It is by way of this sort of fuzzy thinking that James arrived at his (in)famous defense of theological beliefs: belief in God becomes "true" because "[it] yields religious comfort to a most respectable class of minds," which ought to be considered *prima facie* preposterous and accordingly dismissed. Famously, Bertrand Russell said that James's theory of truth committed him to the "truth" that Santa Claus exists, and I am inclined to go with Bertie on this one.

A third alternative to the CToT is represented by one version or another of verificationism. This notion goes back to the British empiricists, and particularly to Hume and his famous "fork." As he put it in the *Enquiry Concerning Human Understanding*: "If we take in our hand any volume; of divinity or school metaphysics, for instance; let us ask, Does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matter of fact and existence? No. Commit it then to the flames: for it can contain nothing but sophistry and illusion."

So Hume recognized two types of truths: empirical ones, subject to verificationism, and logical-mathematical ones, for which he seemed to adopt something like a coherence theory of truth.

The problem with verificationism is that it had its heyday with the logical positivists of the early part of the twentieth century, but then fell out of favor after sustained criticisms by philosophers such as W.V.O. Quine and Hilary Putnam. The most famous of these objections is that the verification principle itself can neither be verified empirically nor is it a mathematical truth, thereby failing the criteria set forth in Hume's fork.

I find a few other alternatives to the CToT to be less palatable or promising. For instance, the identity theory says that true propositions do not *correspond* to facts, they *are* facts. It is, however, not straightforwardly clear what one may mean by saying this. Or consider deflationist approaches to truth: According to the CToT, "Snow is white" is true if it corresponds to the fact that snow is white; for a deflationist, however, "Snow is white" is true if snow is (in fact) white. The move basically consists in dropping the "corresponds to" part of the CToT. Fine, but I can't see how this is much more than a clever semantic move.

Finally, a more interesting position, in my mind, is represented by something called "alethic pluralism," according to which truth is multiply realizable. As philosopher Marian David puts it: "truth is constituted by different properties for true propositions from different domains of discourse: by correspondence to fact for true propositions from the domain of scientific or everyday discourse about physical things; by some epistemic property, such as coherence . . . for true propositions from the domain of ethical and aesthetic discourse, and maybe by still other properties for other domains of discourse." This essentially closes the circle, as alethic pluralism conjoins our discussion of theories of truth with our initial observation—you may remember—that "facts" come in a variety of flavors (empirical, mathematical, logical, ethical, etc.), with distinct flavors requiring distinct conceptions of what counts as true. ■

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Sheaffer's "Psychic Vibrations" column has appeared in the SKEPTICAL INQUIRER for more than thirty years; its highlights have now been published as a book (Create Space, 2011). Sheaffer blogs at www.BadUFOs.com, and his website is www.debunker.com.

UFO Hoaxes? There's an App for That!

Anyone who follows news stories about UFOs knows that there are a heck of a lot of them these days, and that many of them involve photographs. Frank Warren of *The UFO Chronicles* has written an eye-opening article, "UFO Hoaxes with the Touch of a Finger" (http://tinyurl.com/UFOapp). Warren is well known as a UFO proponent, but he is no friend to hoaxers. I knew that it was possible to create all manner of digital UFOs in photographs. What I did not realize was just how easy it has become. Warren notes that there are many iPhone and/or Android apps written specifically for inserting UFOs into photos:

- UFO Camera gold
- UFO Photo Prank (also sometimes called UFO Revelator or OVNICA).
- UFO Camera
- UFO Photo Bomb
- Camera 360

Most of these apps allow you to select the UFO you wish to add, size it, and place it where you want it to be. One of the UFO choices in UFO Camera Gold is my very own Cottage Cheese Container UFO, published many times, that can be seen on my Skeptics' UFO Page (http://debunker.com/ufo.html). Some of these apps can insert aliens into your photos as well. Warren cites two examples of credulous UFO news stories that have been written about fake photos made with apps just like these. It's true that these are not great-quality fakes. Warren says, "For most seasoned Ufologists the hoaxed photos are blatantly obvious; unfortunately, that minority won't stop the MSM [mainstream media] from paying heed to the latest hokum produced." Unfortunately, he is quite correct: it seems that some of the most credulous people around are reporters, who are supposed to be skeptical by their profession. I suspect that the cynical pursuit of sensationalism and ratings is really behind that.

What all this means is that it is now trivially easy for just about anyone to produce a semi-convincing UFO photo hoax. And since "progress" in software is inevitable, we can expect to see better and better UFO hoax photos with each passing year. Which means: unless you can absolutely confirm a photo's origin, and confirm that a UFO was not simply added using hoaxing software, you can't believe anything that you see in a supposed UFO photo any longer.

* * *

On June 20, 2013, news outlets reported that the British Ministry of Defense (MoD), which closed down its UFO Sightings desk in 2009, had just released the very last of its UFO files into the public domain. You can read the files at http://ufos.nationalarchives.gov.uk/. One would expect that well-known UFO proponents, who have been hollering for "UFO disclosure" for years, would be delighted. If so, one would be wrong. Nick Pope, for example, is very upset, and so are many others.

Nick Pope is a major UFO celebrity, originally from the United Kingdom but now living in the United States. He claims that he was skeptical of UFOs prior to his work at the MoD UFO desk (there never was such a thing as a "UFO Project"), but in fact Pope believes he was abducted by aliens during a trip to Florida in January 1991, before

he began working for the MoD. The *Sunday Times* of London reported on February 7, 1999, that

> The Ministry of Defence official who once headed investigations into unidentified flying objects believes he was abducted by aliens. Nick Pope, who [allegedly] ran the ministry's top secret Airstaff Secretariat office during the early 1990s, believes that he, his girlfriend and their car were abducted from a deserted toll road in Florida. He has described how he was lifted aboard an alien spacecraft and then wandered around its corridors—without, however, meeting any aliens.

In reality, while Pope claims he ran "the British Government's UFO Project," he didn't run anything, and only worked part-time at the UFO Desk from 1991 to 1994. In the summer of 2012, Pope was in many news stories warning about a supposed "alien invasion" that could come at any time. He also warned of possible mass UFO appearances during the London Olympics.

Pope has recently been on the defensive, emphasizing that he did not actually predict an alien invasion, as many news stories and blogs reported in the summer of 2012. He said he was merely promoting a "space war" type of video game, and reporters took his comments out of context. However, he can't explain away comments like, "The government must—and has planned—for the worst-case scenario: alien attack and alien invasion. Space shuttles, lasers and directed-energy weapons are all committed via the Alien Invasion War Plan to defence against any alien ships in orbit." Just do an Internet search for "Nick Pope Alien Invasion," which brings up many news stories, including this later one from October 12, 2012, "Britain has alien-war weapons, says former government adviser," and even "Aliens Could Attack at Any Time" from 2006.

One reason that UFOlogists are upset is that the newly released UFO files contain nothing whatsoever of any real interest, and are in fact rather embarrassing to the pro-UFO side. As reported by the BBC:

> Carl Mantell of the RAF's Air Command, suggested the MoD should try to significantly reduce the UFO work. He said it was "consuming increasing resource, but produces no valuable defence output." He told Mr. Ainsworth that in more than 50 years, "no UFO sighting reported to [the MoD] has ever revealed anything to suggest an extra-terrestrial presence or military threat to the U.K." Among the 4,400 pages of documents released are:
>
> • A letter from a school child in Altrincham, Greater Manchester, to the MoD, dated January 2009, asking if aliens exist after she had seen some strange lights, and including a drawing of an alien in a UFO waving.
>
> • A report received via the UFO hotline by someone who had been "living with an alien" in Carlisle for some time.
>
> • A report from a man from Cardiff who claimed a UFO abducted his dog, and took his car and tent, while he was camping with friends in 2007.

When my name was included on a list prepared by NASA during the 1970s and 1980s of people who had information on UFOs (since they did not), I used to receive dozens of letters like this. Most of the correspondence came from schoolchildren requesting information. I would usually reply with just a page or two of skeptical materials, but I suppose that was not what they wanted to receive.

David Clarke, according to *The Telegraph* (June 21, 2013), "has been the National Archives 'UFO consultant' for five year[s of the] project, during which it has made public more than 52,000 pages of official government files relating to mysterious sightings." Clarke is a former reporter and currently course leader and senior lecturer in journalism at Sheffield Hallam University teaching media law and investigation skills. His PhD is in folklore from the National Centre for English Cultural Tradition, University of Sheffield. Since 2008, he has been working with The National Archives (TNA) as their consultant for the ongoing release of the UFO files created by Britain's Ministry of Defence. Clarke says that

> from 2000 onwards my FOI campaign made me a thorn in the side of the MoD to the extent that after seven years of constant pressure they relented and decided to transfer all surviving UFO papers to The National Archives. But instead of hailing the disclosure as a breakthrough, conspiracy nuts have portrayed it as a cover-up because the documents do not provide any support for their beliefs (http://tinyurl.com/pv6d6da).

Pope's reply was quoted:

> A claim by the British Ministry of Defence that UFOs have no defense significance is "designed solely to keep Parliament, the media and the public off our backs," according to former MoD UFO Desk administrator Nick Pope. . . . Official MoD spokesmen and one self-styled UFO expert, David Clarke, claims that the MoD found no evidence of a UFO threat to the UK and, therefore, closed its UFO Desk. . . .

Regarding David Clarke, Pope says, "Some people would probably use the term 'useful idiot' to describe his parroting the MoD 'no defense significance' sound bite."

Clarke had made a Freedom of Information request of the MoD for "copies of MoD papers, records, or other information relating to internal discussion, policy and/or briefings in response to public statements made to the media and via the release of *Open Skies, Closed Minds* by Nick Pope during the period 1995–96" (http://drdavidclarke.blogspot.co.uk/2010/07/open-skies-closed-files.html).

As Clarke explained to Pope at the time, "my request was specifically for 'internal comment on your Press interviews in 1996 and MoD's discussion of what line to take' and not for access to his private correspondence with his employers over the clearance of his manuscript (with one exception that concerns a specific letter which he had quoted from in the public domain)." Clarke's request was not granted, and it turns out that the reason was that Pope "has written to the MoD and asked for the information not to be released into the public domain."

So much for "full disclosure"! ■

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Taking Our Medicine: What Hope for Skepticism in Healthcare?

Why can't we meet with and interview our primary care doctors before hiring them? Even during treatment, why are so many of us reluctant to ask questions probing our physicians' competence, rationality, or general intelligence? And why do so many physicians really wear those gleaming white coats and frequently insist we address them by the lofty title of "doctor"?

Such simple inquiries might lead average patients to suspect that so-called "medical science" and American healthcare in particular prospers best in a self-serving culture of secrecy, arrogance, and denial. But average patients, certain experts say, don't know the half of it.

Evidence suggests, for example, that one in four American patients is harmed by medical mistake—the fifth leading cause of death in the United States. Doctors operate on the wrong person or body part as often as forty times per week, and, according to a recent survey of leading medical professionals, approximately 25 percent of all medications and medical procedures are unnecessary.

In 2008, the nonprofit Washington D.C.-based National Quality Forum released a list of overused tests and treatments. Included were antibiotics, X-rays, cardiac CT scans, heart bypass surgeries, back surgeries, knee and hip replacements, prostatectomies, angioplasties, and hysterectomies.

Indeed, little-known research shows that one-third of American heart bypass patients never required surgery. Every year, 300,000 women—many of whom die prematurely from cardiovascular disease and osteoporosis-related conditions—have healthy ovaries removed for no reason. Tens of thousands of children receive unneeded ear tube implantations annually, and a similar number of adults submit to back surgeries unsupported by evidence of success.

Medical overuse is a money-hungry green monster, say healthcare experts Rosemary Gibson and Janardan Singh. It not only "thrives on the fact that too little scientific evidence exists to justify a great deal of today's medical practices," it also "wants to prevent good science from informing policymakers and the public about what really works" (Gibson and Singh 2010).

The U.S. consumes more medical products and services than any other country on the planet. In 2010, America spent 16 percent of its gross domestic product on healthcare, and, according to the Congressional Budget Office, that share will swell to a whopping 25 percent by 2025.

Pulling no punches, Gibson and Singh argue that "volume, volume, volume" is the primary aim of today's "highly-caffeinated" healthcare industry. Hospitals, clinics, and physicians, they say, will gleefully "sell anything," including "tests, treatments, and procedures that are inappropriate, unaffordable, and promise more than they can deliver."

Patients, on the other hand, tend to be easy marks, checking their common sense and consumer skepticism at the lobby doors. For whatever reasons—fear, hope, misplaced trust, the reckless and emotion-stoking popular media, or a deplorably enabling and inapt insurance scheme—American patients are clearly convinced: more is always better.

The most common and expensive overuse occurs daily—office visits, intra-facility referrals, lab tests, and X-rays, most routinely. Expensive for patients, that is, but quite lucrative for healthcare providers.

In 2004, the National Institutes of Health featured X-rays on its list of known carcinogens, capable of triggering breast, lung, and thyroid cancers and leukemia. Of course the benefits of X-rays—relatively benign, single-snapshot exposure techniques—generally outweigh the risks for patients in need.

Computed tomography (CT) scans are another subject. Consisting of hundreds of X-ray beams generating high-definition, three-dimensional images, CT scans have become exceedingly popular. Three million were

performed in 1980. Today, Americans expose themselves to sixty million every year.

But that's how the use of new and beneficial technology trends, right? Not so fast. According to a 2007 *New England Journal of Medicine* study, one-third of adults and one million children annually are unnecessarily exposed to CT scan radiation (Brenner and Hall 2007). A 2004 study in *Radiology* discovered as well that one in 1,200 forty-five-year-olds who undergo a single full-body CT scan will die from radiation-induced cancer later in life, as will one in fifty who receive annual scans for thirty years (Brenner and Elliston 2004).

After leading the International Atomic Energy Agency team to Chernobyl following the nuclear power catastrophe in 1986, Dr. Fred Mettler began studying the effects of medical imaging techniques in the U.S. In 2008, his *Radiology* report revealed that these all-too common tests constitute our primary source of exposure to ultra-hazardous ionizing radiation (Mettler et al. 2008).

Healthcare professionals and administrators are quick to remind us that patients frequently ask for superfluous treatment. Nevertheless, hospitals and the popular media often share cozy economic relationships in which the former control content and the latter forsake journalistic integrity. Indeed, in my hometown of La Crosse, Wisconsin, a local television "news" station has effectively reduced itself to a mere advertiser of area medical services.

Even so, most culpable are those managing the dysfunctional culture of healthcare. In 2000, one study found that most elective angioplasty patients could not recall being informed of even one risk factor, including stroke, heart attack, and death (Holmboe et al. 2000). How might misinformation affect outcomes? Difficult to say, but a 2011 *JAMA* paper found that, of the 200,000 heart angioplasties performed in the U.S. every year, 38 percent result from "uncertain" and another 12 percent from "inappropriate" indications (Chan et al. 2011).

In 2010, a similar study revealed that doctors were more likely to discuss only potential benefits, and that a scant 20 percent of prospective back surgery patients, and 30 percent of knee- and hip-replacement patients, were ever advised of potential complications (Zikmund-Fisher et al. 2010). Yet many back surgeons, for example, maintain that degenerative disc disease—the most commonly cited indication for spinal fusion surgery—can be treated just as effectively with physical therapy and medication.

According to Marty Makary, Johns Hopkins surgeon and associate professor of health policy, "Every subspecialty of medicine has its own particular tropism toward overtreatment" (Makary 2012). One problem, he explains, is the common yet frequently undisclosed "eat-what-you-kill" model of physician compensation, where doctors are paid like salesmen—in part, through lucrative commissions.

In the U.S., radiation is regularly prescribed for treatment of pancreatic cancer. Curiously, however, such cancers respond to chemotherapy only about 25 percent of the time and, even then, patients live an average of only one (very unpleasant) month longer.

The patient decides, of course. But can decisions be characterized as "informed" when neither hospitals nor their physicians disclose highly relevant facts? First, in contrast to most situations involving prescription drugs, hospitals hold relative monopolies on the sales of chemotherapy and, as such, can charge whatever markups they deem feasible. Second, ignoring potential conflicts of interest, prescribing doctors earn bonuses based on their sales of chemo.

Healthcare professionals and administrators are quick to remind us that patients frequently ask for superfluous treatment. Nevertheless, hospitals and the popular media often share cozy economic relationships in which the former control content and the latter forsake journalistic integrity.

Professional associations like the AMA require physicians to disclose commercial affiliations to medical journals when publishing and to audiences when speaking. The government also compels reporting of funds received from drug and device companies. Patients, on the other hand, are frequently left in the dark during their most desperate moments.

But hospital opacity certainly doesn't end there. Potential customers would doubtless prefer to know how many times a particular procedure is performed each year by a given facility's staff. Indeed, a 2003 *New England Journal of Medicine* study revealed quite clearly that volume matters. For example, in hospitals where surgeons performed more than four pancreas

operations annually, the death rate was 4.6 percent. By contrast, where they operated fewer than two times, mortality rose to 14.7 percent (Birkmeyer et al. 2003).

Even so, American hospitals tend not to divulge such information. Administrators might argue, for instance, that doing so would harm new doctors. Apprenticeships, however, are very common and successful in other parts of the world. State-of-the-art patient simulators would also help train inexperienced physicians. But such programs are expensive and might threaten hospitals' bottom lines—not to mention administrators' and older physicians' salaries.

Instead, according to Makary, hospitals "pump endless amounts of money into advertising campaigns." They disingenuously market themselves as "comprehensive cancer centers," for example, in an effort to boost their "essentially bogus" rankings in popular magazines and to lure new customers who have little else upon which to base their decisions.

So what happens to consumers who become patients in substandard facilities or departments—will they ever be referred to better hospitals? Unlikely, says Makary. "Over time," he recalls, "I learned that suboptimal care—even when better care was known to be just a referral away—was ubiquitous."

Our system of physician accountability is no better. Makary, in fact, likens it to that of the Roman Catholic Church, which infamously chose to reassign, rather than remove, child-molesting priests. In 2011, Public Citizen revealed that wayward doctors are seldom reported to state medical boards. Of the 10,672 physicians with disciplinary actions pending between 1990 and 2009, including 220 who had lost medical privileges on an emergency basis, more than half went unreported.

But part of the problem is that medical standards are not nationalized. Unlike aging pilots, for example, who are removed by the FAA as they lose their vision, reflexes, or good judgment, physicians are often allowed to work until they die. Worse yet, compared to others of similar educational background and socioeconomic status, doctors suffer from elevated rates of serious substance abuse and psychiatric disease.

Useful records do exist. The U.S. Department of Health and Human Services, for instance, maintains the National Practitioner Data Bank listing all doctors who have been disciplined, suspended, or have lost or settled malpractice suits. But the general public has no access. Only state medical boards and human resource departments can retrieve the physicians' names.

Overtreatment and medical mistakes affect us all. We pay for them in higher medical bills (and, as taxpayers, higher Medicare costs) and in higher insurance premiums and deductibles. Yet, in the current culture of medical secrecy, arrogance, and denial, hospitals and physicians have little or no incentive to compete based on medical outcomes, efficacy, and patient safety.

Changes are underway. Massachusetts and Minnesota require hospitals to reveal the number of specific procedures they perform each year. New York facilities report mortality rates for heart bypass surgery, and several more hospitals now use safety-attitude questionnaires to encourage openness, communication, and teamwork.

But much more needs to be done. First, we must radically expand, standardize, and perhaps even nationalize the cache of data available or, better yet, automatically volunteered to all patients. Public health was revolutionized by evidence-based medicine. The administration of healthcare is no less critical and should follow the same model.

Second, we need to reconsider the ways in which many physicians are compensated. Doctors should not be encouraged to act as salespeople for their hospitals or, worse yet, for equipment manufacturers and drug companies. Everyone should agree that perverse incentives and conflicts of interest ought to be eliminated.

Finally, consumers must aggressively represent their own interests. Each patient who regards him- or herself as something less than a customer, or his or her doctor as something more than a human being providing a competitive service, makes it that much harder for the next patient who does not.

We must unflinchingly carry our skepticism past the lobby doors and into the examination room. Doctor-patient relationships must be derived from mutual candor, integrity, and humility. Only then can meaningful healthcare reform begin. ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

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Paranormal Qualifications

Q: **How do you handle people who think they are worthy of respect because of "knowledge" of an unproven field such as ghosts or Bigfoot?**

—C. Brown

A: The issue of expertise and authority in paranormal subjects is an important question, and the answer depends on how you define the topic and what aspect you are studying. Sociologists and economists, for example, are experts on intangible and abstract subjects. It is quite possible to be an expert on the folklore or concept of something that may not exist. A priest, imam, or rabbi, for example, is a legitimate expert on a specific belief system that may or may not be objectively valid or "true." I am an expert on many areas of the paranormal, including the chupacabra and ghosts, in terms of the history, evidence, and arguments offered for them—but not as proven entities.

Part of the issue is a common misunderstanding of what exactly is being investigated. I discuss this topic in my book *Scientific Paranormal Investigation: How to Solve Unexplained Mysteries*:

> Often in discussions of paranormal topics, the subjects themselves (ghosts, Bigfoot, etc.) are treated as if there was a universally agreed-upon definition of what these things are, or what their nature is. But these terms are simply names for specific *experiences*, not discrete objects or entities. Simply calling something a Bigfoot or ghost does not explain anything, as no one knows that Bigfoot or ghosts exist, much less their nature. It's basic logic: You can't claim to positively identify something without knowing the specific nature of that thing. Correctly identifying X necessarily means you must know what X is, what established characteristics distinguish it from Y and Z; there's no way around it. Thus labels like chupacabra, ghost, fairy, Bigfoot, and so on are useful only as descriptive shorthand; for an investigator is it more accurate and useful to think of them as descriptors for an experience. Once the mystery is approached from this angle, it becomes potentially solvable. A scientific paranormal investigator can no more test, analyze, or examine a Bigfoot or ghost than a botanist can study a wahoozle or a car mechanic can run a test on a frammis. The investigation becomes one not of identifying the Bigfoot or ghost but of trying to understand what the eyewitness experienced, what the person *interpreted* as a Bigfoot or a ghost. This step is one of the most important, and a common reason why investigations fail, or end up with ambiguous results. You must use meaningful labels to understand the phenomenon.

Where "experts" get into trouble is when they pretend or assume (or allow others to assume) that these topics are proven or more factual than they really are. Paranormal experts must be very honest about what they do and do not know, about distinguishing fact from speculation. There are countless self-proclaimed experts in paranormal fields; sometimes they have meaningless diploma-mill degrees in esoteric or metaphysic studies. I often read biography blurbs of ghost hunters or paranormal investigators that begin with a phrase like, "I have investigated ghosts for forty years . . ." but the question is not how long you've been doing something, but whether you're good at it. What exactly has that person been doing for four decades? Wandering around abandoned hospitals with cameras and voice recorders? Appearing at ghost conventions shilling his DVDs?

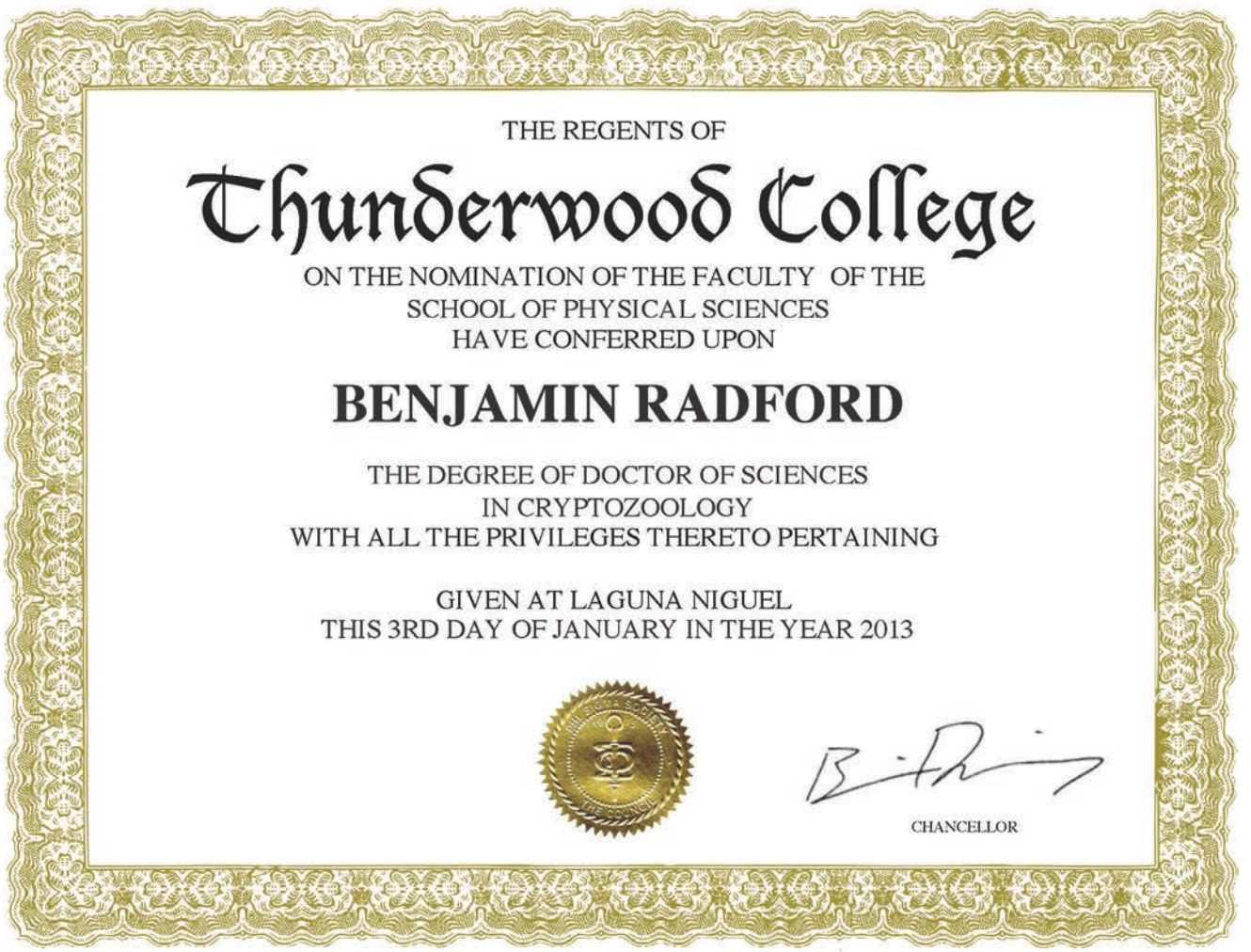
Where "experts" get into trouble is when they pretend or assume (or allow others to assume) that these topics are proven or more factual than they really are.

Has he actually *solved* any cases or investigations or has he simply added to the pile of ambiguous and inconclusive results that he and his ilk compile with such eagerness and proficiency?

There are thousands of people in the world who call themselves paranormal investigators, ghost hunters, or something similar. Paranormal investigation requires no certificate; anyone can do it with no training, knowledge, or expertise whatsoever. Whether he is effective or not—if he actually solves any mysteries—is another matter entirely.

There are even some "paranormal investigation" handbooks claiming to instruct readers on how to look into ghosts and the supernatural. The problem is that, with a few exceptions, none of the authors has any background in logic, investigation, or science. They may be writers, but they do little or no actual investigation. Merely collecting ghost stories or Bigfoot reports is not investigation. In short, most "experts" on the paranormal have little if any credibility; they are simply folks who have an interest in the topics and have decided to write books that mostly ignore the skeptical, rational explanations in favor of mystery-mongering. Readers should research the authors to evaluate their credibility and history of successful investigation and solved mysteries. The situation becomes murkier when people try to profit from their alleged expertise. Some ghost and Bigfoot hunters, for example, charge the public for their "services" as paranormal experts to expel demons from houses or spend a weekend searching for Sasquatch.

Part of the original question was about people who feel entitled to respect as an authority because they know something about the paranormal. In my opinion respect is earned through genuine accomplishment—not simply from knowing something about a topic from reading books and magazines or watching television but by making real contributions to the body of knowledge about these topics through original research and investigation. ■


THE REGENTS OF

Thunderwood College

ON THE NOMINATION OF THE FACULTY OF THE
SCHOOL OF PHYSICAL SCIENCES
HAVE CONFERRED UPON

BENJAMIN RADFORD

THE DEGREE OF DOCTOR OF SCIENCES
IN CRYPTOZOOLOGY
WITH ALL THE PRIVILEGES THERETO PERTAINING

GIVEN AT LAGUNA NIGUEL
THIS 3RD DAY OF JANUARY IN THE YEAR 2013

CHANCELLOR

The Future of High Energy Physics in the United States

KEVIN T. PITTS

The past year saw the discovery of the Higgs boson, one of the greatest achievements in the history of science. Marvin Mueller's article "The Higgs Boson and the Future of Physics" in the November/December 2012 Skeptical Inquirer put the discovery into historical context. The breakthrough in the Higgs search represents an amazing scientific advance as well as a tremendous technical achievement. The discovery took place at the Large Hadron Collider (LHC) operating at the European Center for Nuclear Research (CERN). Since the LHC is the highest energy particle accelerator ever constructed, it lays claim to the "energy frontier." Although many American scientists participate in the experimental program at the LHC, it is fair to ask, "Why wasn't this discovery made in the United States?" And perhaps more important, "Is there a high energy physics program in the United States? What is the U.S. doing in high energy physics?"

High energy physics uses large particle accelerators to learn about particles and forces that have not existed naturally since a tiny fraction of a second after the big bang. We take advantage of the equivalence between energy and mass through Einstein's famous $E=mc^2$ equation. In that equation, E represents the initial particle energy, m is the mass produced, and c is a constant, the speed of light. When we accelerate particles (like electrons or protons) to extremely high energy (very large E) and collide them with other particles, the collision can create new particles with very large mass. These massive particles live for a trillionth of a second or less before decaying into other, lighter particles. By studying these collisions in detail, we can learn about the building blocks of nature and at the same time learn about the universe as it existed 13.7 billion years ago—the time of the big bang.

Recent years have seen a dramatic shift in the landscape for high energy physics in the United States. In 2006, we had three major particle accelerators operating domestically. Two were electron-positron colliders—positrons are antimatter electrons—one at Cornell University and the other at the Stanford Linear Accelerator Center.[1] The third was the Tevatron operating at Fermilab outside of Chicago. The Tevatron collided protons and antiprotons. For most of its lifespan, from the mid-1980s to 2008, the Tevatron was the highest energy collider in the world.

Between 2008 and 2011, all three U.S. colliders were turned off and the LHC in Europe was turned on. The decommissioning of the U.S. colliders was, in part, due to the fact that they had been running for several years and each one had completed a very strong scientific program. In the case of the Tevatron, its relevance began to wane with the turn-on of the LHC. Over its lifespan, Tevatron experiments published over 1,000 scientific papers in peer-reviewed journals, including important insights into the nature of the Higgs boson itself. Scientists continue to analyze Tevatron data and will do so for many years to come.

Could the Higgs boson have been discovered in the United States? The answer is yes. In the early 1990s, construction was underway in Texas on the Superconducting Super Collider (SSC), a high energy collider that, if completed, would have been twenty

Fermilab

times more energetic than the Tevatron (and five times more energetic than the current LHC running). The SSC was scheduled to begin operations in 1999, but was terminated by Congress in the fall of 1993. Had the SSC been completed, it would have certainly found the Higgs. And given the higher energy, the SSC would have also provided a better opportunity for additional discoveries.

But the U.S. doesn't have the SSC, and all of our major particle collider experiments have ended. So what's next for the U.S.? Europe has the energy frontier with the LHC. What can and should we be doing?

The answer is "neutrinos." Neutrinos are particles that interact very weakly with matter. There are about a million billion (10^{15}) neutrinos passing through your body every second. They don't bother you because they pass through your body (and Earth) without interacting at all. In fact, a typical neutrino would pass through a light-year of lead without interacting! Most neutrinos in our neighborhood arise as byproducts of the nuclear reactions fueling the Sun, but neutrinos arise from many sources. For example, a typical supernova produces 10^{58} neutrinos per second. That's an unfathomable number. I can't think of a way to comprehend a number that big; to help you grasp how hard it is to understand, consider that there are about 10^{21} grains of sand on Earth.

So what's next for the U.S.? Europe has the energy frontier with the LHC. What can and should we be doing? The answer is "neutrinos."

Particles like the Higgs boson and the top quark (discovered at the Tevatron in 1995) are very massive. The top quark (a fundamental particle with no observed substructure) is almost as heavy as a gold atom, which consists of seventy-nine protons and 118 neutrons. Neutrinos, on the other hand, are unique because they are so light. It was originally thought that neutrinos had no mass at all. But we've learned in the last fifteen years that neutrinos have an incredibly tiny mass, but they are definitely not massless. One of the consequences of neutrinos having mass is they can transmute from one type to another. A neutrino born as an "electron neutrino" might later be measured as a "muon neutrino." This type of behavior is never seen in the macroscopic world—you don't enter a tunnel driving a minivan and exit the tunnel in a sports car!

Fermilab

The transmutation of neutrinos might help explain why our universe has matter but no antimatter. The so-called "matter/antimatter asymmetry" is necessary for life—we wouldn't be around if equal amounts of matter and antimatter populated the universe. If the transmutation rate is different for neutrinos and antineutrinos, that might explain how our universe ended up as matter-dominated. If there were no mechanism to tilt the balance in favor of matter, the universe would be full of photons with absolutely no chance for stars, planets, or life to form.

In addition, small neutrino masses are more difficult to accommodate theoretically than massless neutrinos. As a consequence, it is very likely that neutrinos can tell us about how the universe works at an energy scale that is much, much higher than we could ever hope to access using conventional particle colliders. By studying neutrinos in detail, we are performing research on the building blocks of matter that is complementary to the work being done at the LHC.

Worldwide, the high energy physics community has repeatedly stated that a program to systematically measure neutrino properties is a very high priority.[2] To do this, however, is a challenge. Neutrinos can be produced using a particle accelerator, but the challenge is in detecting these neutrinos. Since neutrinos will pass through trillions of miles of lead without hitting anything, we need enormous detectors to try to observe them. And to reduce backgrounds from cosmic rays, we need to put the detector far underground.

Imagine a neutrino detector the size of a fifteen-story building residing in a cavern a mile underground. It's a challenging environment and a tough way to do physics, but our desire to learn about nature has driven us to this experimental configuration.

Experiments of this type have been carried out before. We currently send

a beam of neutrinos from Fermilab in Illinois to an underground mine in northern Minnesota. The large detector there has observed a clear indication of the neutrino transmutation described above. To learn even more about the neutrino and what it's telling us about nature, the United States has proposed the Long Baseline Neutrino Experiment (LBNE). A beam of neutrinos is produced by the accelerator at Fermilab. The beam passes underground to a detector residing in a mine in South Dakota. The large distance between the source and the detector is necessary to give the neutrinos time to transmute from one type to another.

To make this experiment work, we need the particle accelerator to produce a fire hose of protons, but they don't need to be at ultra-high energies because neutrinos are so light. While the LHC accelerates protons to very high energy, the actual number of protons in the LHC is not very big. At Fermilab, to carry out neutrino research, we don't need the highest energies, but we do need lots and lots of protons. We refer to this as a "high intensity" accelerator because of the number of particles accelerated. While the LHC is the energy frontier, we refer to the Fermilab research program as the "intensity frontier." In addition to lots of protons, you need a gigantic neutrino detector at the remote site. In this case, the detector will be 34,000 tons of liquid argon. This type of detector is dense (argon is pretty heavy) so neutrinos are more likely to interact, and it has very nice properties that allow precise measurements of the neutrinos that do interact.

This isn't the type of experiment that you develop overnight. The LBNE effort will cost more than $1 billion and take a decade to complete. A project of this size and scope is exceedingly difficult to undertake in the current U.S. political and budget climate. In 2011, the U.S. Department of Energy instructed physicists to de-scope the LBNE effort in order to reduce the cost. This will significantly lengthen the time it will take to launch this important experiment.

To make up for the lack of domestic funding, we look for international partners. This is natural because high energy physics is a truly international endeavor. Unfortunately, we find that other nations hesitate to work with the United States because of our poor track record as a partner in international scientific collaboration.

In the meantime, Fermilab will use the high intensity proton beams to carry out a suite of other experiments. Some of them involve neutrinos, while others involve other particles such as muons and kaons. It's unlikely that any single experiment will tell us all we need to know about how nature works. But taken together, they will help us piece together the inner workings of the cosmos. I refer to this as the "Crime Scene Investigation approach" (the "other CSI!") that has become familiar on crime TV shows. In high energy physics, we don't have an eyewitness to the event, so we need to string together every tiny piece of evidence we can find. No one piece of evidence by itself will allow us to solve the mystery, but taken together many pieces of evidence can help us to understand the structure and history of the universe. Each experiment we undertake provides evidence. Without many lines of evidence, we won't find our suspect or how the crime was done.

In the U.S., high energy physics research is funded primarily by the Department of Energy, with some support from the National Science Foundation. A common question we get is, "Why should the federal government fund this research?" The first answer is curiosity. Our quest to understand how nature works and why we are here has driven us to this next generation of experiments. But if curiosity isn't enough, then how about technology, innovation, and education? To carry out these experiments, we are pushing the envelope in accelerator technology, magnet technology, computer technology, electronics, and imaging. More than half of our economic growth stems from new technology, so a modest investment in physics research translates directly into large gains in the economy through technology and innovation. Some of the past products from high energy physics include: the World Wide Web, accelerator technology for cancer therapy, and magnet and detector technology for medical imaging (MRIs and PET scanners). Finally, high energy physics excites young people and motivates them to enter careers in science and engineering. These highly trained students go on to play a role in virtually every aspect of our economy and lifestyle, from Silicon Valley to homeland security.[3]

The U.S. high energy physics program is healthy and exciting, but political and budgetary restrictions limit the rate at which we can make progress. With a modest investment of taxpayer dollars, we can continue our quest to understand the universe and produce technological innovations and a highly trained workforce along the way. Curiosity drives the human mind, and technology drives the U.S. economy. A healthy high energy physics program can stimulate both. We didn't discover the Higgs in the U.S., but we hope that the next generation of major discoveries can happen here at home. ■

Notes

1. The two electron-positron colliders in the U.S. last decade were the Cornell Electron Storage Ring (CESR) and the PEP-II Asymmetry Storage Ring operating at the Stanford Linear Accelerator Center.

2. For more information, see "Fundamental Physics at the Intensity Frontier," http://intensityfrontier.org/docs/intensityFrontierReport-080912.pdf.

3. For more information, see *Symmetry Magazine*, "The Benefits of High Energy Physics," Vol. 5, Issue 6, December 2008, http://www.symmetrymagazine.org/sites/default/files/legacy/pdfs/200812/dec_2008.pdf.

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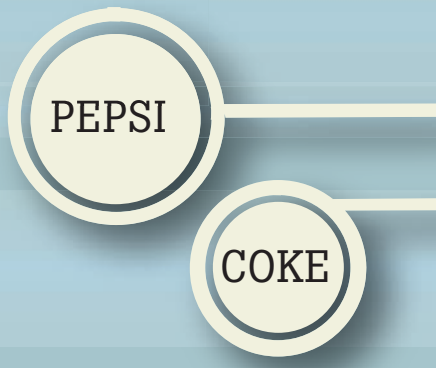
Losing Our Minds in the Age of Brain Science



Neuroscience and its new brain imaging tools are great achievements of modern science. But they are vulnerable to being oversold by the media, some overzealous scientists, and neuroentrepreneurs.

SALLY SATEL AND SCOTT O. LILIENFELD

You've seen the headlines: This is your brain on love. Or God. Or envy. Or happiness. And they're reliably accompanied by articles boasting pictures of color-drenched brains—scans capturing Buddhist monks meditating, addicts craving cocaine, and college sophomores choosing Coke over Pepsi. The media—and even some neuroscientists, it seems—love to invoke the neural foundations of human behavior to explain everything from the Bernie Madoff financial fiasco to our slavish devotion to our iPhones, the sexual indiscretions of politicians, conservatives' dismissal of global warming, and even an obsession with self-tanning.

Brains are big on campus, too. Take a map of any major university, and you can trace the march of neuroscience from research labs and medical centers into schools of law and business and departments of economics and philosophy. In recent years, neuroscience has merged with a host of other disciplines, spawning such new areas of study as neurolaw, neuroeconomics, neurophilosophy, neuromarketing, and neurofinance. Add to this the birth of neuroaesthetics, neurohistory, neuroliterature, neuromusicology, neuropolitics, and neurotheology. The brain has even wandered into such unlikely redoubts as English departments, where professors debate whether scanning subjects' brains as they read passages from Jane Austen novels represents (a) a fertile inquiry into the power of literature or (b) a desperate attempt to inject novelty into a field that has exhausted its romance with psychoanalysis and postmodernism.

Clearly, brains are hot. Once the largely exclusive province of neuroscientists and neurologists, the brain has now entered the popular mainstream. As a newly minted cultural artifact, the brain is portrayed in paintings, sculptures, and tapestries and put on display in museums and galleries. One science pundit noted, "If Warhol were around today, he'd have a series of silkscreens dedicated to the cortex; the amygdala would hang alongside Marilyn Monroe."

The prospect of solving the deepest riddle humanity has ever contemplated—itself—by studying the brain has captivated scholars and scientists for centuries. But never before has the brain so vigorously engaged the public imagination. The prime impetus behind this enthusiasm is a form of brain imaging called functional magnetic resonance imaging (fMRI), an instrument that came of age a mere two decades ago, which measures brain activity and converts it into the now-iconic vibrant images one sees in the science pages of the daily newspaper.

As a tool for exploring the biology of the mind, neuroimaging has given brain science a strong cultural pres-

ence. As one scientist remarked, brain images are now "replacing Bohr's planetary atom as the symbol of science." With its implied promise of decoding the brain, it is easy to see why brain imaging would beguile almost anyone interested in pulling back the curtain on the mental lives of others: politicians hoping to manipulate voter attitudes, marketers tapping the brain to learn what consumers really want to buy, agents of the law seeking an infallible lie detector, addiction researchers trying to gauge the pull of temptations, psychologists and psychiatrists seeking the causes of mental illness, and defense attorneys fighting to prove that their clients lack malign intent or even free will.

The problem is that brain imaging cannot do any of these things—at least not yet.

Author Tom Wolfe was characteristically prescient when he wrote of fMRI in 1996, just a few years after its introduction, "Anyone who cares to get up early and catch a truly blinding twenty-first century dawn will want to keep an eye on it." Now we can't look away.

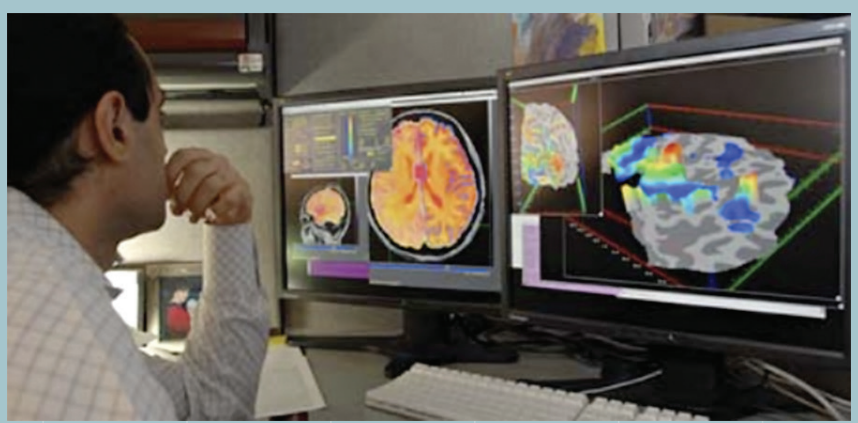
Why the fixation? First, of course, there is the very subject of the scans: the brain itself. More complex than any structure in the known cosmos, the brain is a masterwork of nature endowed with cognitive powers that far outstrip the capacity of any silicon machine built to emulate it. Containing roughly eighty billion brain cells, or neurons, each of which communicates with thousands of other neurons, the three-pound universe cradled between our ears has more connections than there are stars in the Milky Way. How this enormous neural edifice gives rise to subjective feelings is one of the greatest mysteries of science and philosophy.

More complex than any structure in the known cosmos, the brain is a masterwork of nature endowed with cognitive powers that far outstrip the capacity of any silicon machine built to emulate it . . . . Now combine this mystique with the simple fact that pictures—in this case, brain scans—are powerful.

Now combine this mystique with the simple fact that pictures—in this case, brain scans—are powerful. Of all our senses, vision is the most developed. There are good evolutionary reasons for this arrangement: The major threats to our ancestors were apprehended visually; so were their sources of food. Plausibly, the survival advantage of vision gave rise to our reflexive bias for believing that the world is as we perceive it to be, an error that psychologists and philosophers call "naive realism." This misplaced faith in the trustworthiness of our perceptions is the wellspring of two of history's most famously misguided theories: that the world is flat and that the sun revolves around the Earth. For thousands of years, people trusted their raw impressions of the heavens. Yet, as Galileo understood all

too well, our eyes can deceive us. He wrote in his Dialogues of 1632 that the Copernican model of the heliocentric universe commits a "rape upon the senses"—it violates everything our eyes tell us.

Brain scan images are not what they seem either—or at least not how the media often depict them. They are not photographs of the brain in action in real time. Scientists can't just look "in" the brain and see what it does. Those beautiful color-dappled images are actually representations of particular areas in the brain that are working the hardest—as measured by increased oxygen consumption—when a subject performs a task such as reading a passage or reacting to stimuli, such as pictures of faces. The powerful computer located within the scanning machine transforms changes in oxygen levels into the familiar candy-colored splotches indicating the brain regions that become especially active during the subject's performance. Despite well-informed inferences, the greatest challenge of imaging is that it is very difficult for scientists to look at a fiery spot on a brain scan and conclude with certainty what is going on in the mind of the person.



Neuroimaging is a young science, barely out of its infancy, really. In such a fledgling enterprise, the half-life of facts can be especially brief.

Neuroimaging is a young science, barely out of its infancy, really. In such a fledgling enterprise, the half-life of facts can be especially brief. To regard research findings as settled wisdom is folly, especially when they emanate from a technology whose implications are still poorly understood. As any good scientist knows, there will always be questions to hone, theories to refine, and techniques to perfect. Nonetheless, scientific humility can readily give way to exuberance. When it does, the media often seem to have a ringside seat at the spectacle.

Several years ago, as the 2008 presidential election season was gearing up, a team of neuroscientists from UCLA sought to solve the riddle of the undecided, or swing, voter. They scanned the brains of swing voters as they reacted to photos and video footage of the candidates. The researchers translated the resultant brain activity into the voters' unspoken attitudes and, together with three political consultants from a Washington, D.C.–based firm called FKF Applied Research, presented their findings in the *New York Times* in an op-ed titled "This Is Your Brain on Politics." There, readers could view scans dotted with tangerine and neon-yellow hot spots indicating regions that "lit up" when the subjects were exposed to images of Hillary Clinton, Mitt Romney, John Edwards, and other candidates. Revealed in these activity patterns, the authors claimed, were "some voter impressions on which this election may well turn." Among those impressions was that two candidates had utterly failed to "engage" with swing voters. Who were these unpopular politicians? John McCain and Barack Obama, the two eventual nominees for president.

Another much-circulated study, published in 2008, "The Neural Correlates of Hate" came from neuroscientists at University College London. The researchers asked subjects to bring in photos of people they hated—generally ex-lovers, work rivals, or reviled politicians—as well as people about whom subjects felt neutrally. By comparing their responses—that is, patterns of brain activation elicited by the hated face—with their reaction to the neutral photos, the team claimed to identify the neurological correlates of intense hatred. Not surprisingly, much of the media coverage attracted by the study flew under the headline: "'Hate Circuit' Found in Brain."

One of the researchers, Semir Zeki, told the press that brain scans could one day be used in court—for example, to assess whether a murder suspect felt a strong hatred toward the victim. Not so fast. True, these data do reveal that certain parts of the brain become more active when people look at images of people they hate and presumably feel contempt for. The problem is that the illuminated areas on the scan are activated by many other emotions, not just hate. There is no newly discovered collection of brain regions that are wired together in such a way that they comprise the identifiable neural counterpart of hatred.

University press offices, too, are notorious for touting sensational details in their media-friendly releases: Here's a spot that lights up when subjects think of God ("Religion Center Found!"), or researchers find a region for love ("Love Found in the Brain!"). Neuroscientists sometimes refer disparagingly to these

studies as "blobology," their tongue-in-cheek label for studies that show which brain areas become activated as subjects experience X or perform task Y. To repeat: It's all too easy for the nonexpert to lose sight of the fact that fMRI and other brain-imaging techniques do not literally read thoughts or feelings. By obtaining measures of brain oxygen levels, they show which regions of the brain are more active when a person is thinking, feeling, or, say, reading or calculating. But it is a rather daring leap to go from these patterns to drawing confident inferences about how people feel about political candidates or paying taxes, or what they experience in the throes of love.

Pop neuroscience makes an easy target, we know. Yet we invoke it because these studies garner a disproportionate amount of media coverage and shape public perception of what brain imaging can tell us. Skilled science journalists cringe when they read accounts claiming that scans can capture the mind itself in action. Serious science writers take pains to describe quality neuroscience research accurately. Indeed, an eddy of discontent is already forming. "Neuromania," "neurohubris," and "neurohype"—"neurobollocks," if you're a Brit—are just some of the labels that have been brandished, sometimes by frustrated neuroscientists themselves. But in a world where university press releases elbow one another for media attention, it's often the study with a buzzy storyline ("Men See Bikini-Clad Women as Objects, Psychologists Say") that gets picked up and dumbed down.

The problem with such mindless neuroscience is not neuroscience itself. The field is one of the great intellectual achievements of modern science. Its instruments are remarkable. The goal of brain imaging, which is merely one of its tools, is enormously important and fascinating: to bridge the explanatory gap between the intangible mind and the corporeal brain. But that relationship is extremely complex and incompletely understood. Therefore, it is vulnerable to being oversold by the media, some overzealous scientists, and neuroentrepreneurs who tout facile conclusions that reach far beyond what the current evidence warrants—fits of "premature extrapolation," as British neuroskeptic Steven Poole calls them. When it comes to brain scans, seeing may be believing, but it isn't necessarily understanding.

Some of the misapplications of neuroscience are amusing and essentially harmless. Take, for instance, the new trend of neuromanagement books such as *Your Brain and Business: The Neuroscience of Great Leaders*, which advises nervous CEOs "to be aware that anxiety centers in the brain connect to thinking centers, including the PFC [prefrontal cortex] and ACC [anterior cingulate cortex]." The fad has, perhaps not surprisingly, infiltrated the parenting and education markets, too. Parents and teachers are easy marks for "brain gyms," "brain-compatible education," and "brain-based parenting," not to mention dozens of other unsubstantiated techniques. For the most part, these slick enterprises merely dress up or repackage good advice with neuroscientific findings that add nothing to the overall program. As one cognitive psychologist quipped, "Unable to persuade others about your viewpoint? Take a Neuro-Prefix—influence grows or your money back."

Skilled science journalists cringe when they read accounts claiming that scans can capture the mind itself in action. Serious science writers take pains to describe quality neuroscience research accurately.

But reading too much into brain scans matters when real-world concerns hang in the balance. Consider the law. When a person commits a crime, who is at fault? The perpetrator or his or her brain? Of course, this is a false choice. If biology has taught us anything, it is that "my brain" versus "me" is a false distinction. Still, if biological roots can be identified—and better yet, captured on a brain scan as juicy blotches of color—it is too easy for nonprofessionals to assume that the behavior under scrutiny must be "biological" and therefore "hardwired," involuntary, or uncontrollable. Criminal lawyers, not surprisingly, are increasingly drawing on brain images supposedly showing a biological defect that "made" their clients commit murder. Looking to the future, some neuroscientists envision a dramatic transformation of criminal law. David Eagleman, for one, welcomes a time when "we may someday find that many types of bad behavior have a basic biological explanation [and] eventually think about bad decision making in the same way we think about any physical process, such as diabetes or lung disease." As this comes to pass, he predicts, "more juries will place defendants on the not-blameworthy side of the line."

But is this the correct conclusion to draw from neuroscientific data? After all, if every behavior is eventually traced to detectable correlates of brain activity, does this mean we can one day write off all troublesome behavior on a don't-blame-me-blame-my-brain theory of crime? Will no one ever be judged responsible? Thinking through these profoundly important questions turns on how we understand the relationship between the brain and the mind.

The mind cannot exist without the brain. Virtually all modern scientists, ourselves included, are "mind-body monists": they believe that mind and brain are composed of the same material "stuff." All subjective experience, from a frisson of fear to the sweetness of nostalgia, corresponds to physical events in the brain. Decapitation proves this point handily: no functioning brain, no mind. But even though

the mind is produced by the action of neurons and brain circuits, the mind is not identical with the matter that produces it. There is nothing mystical or spooky about this statement, nor does it imply an endorsement of mind-body "dualism," the dubious assertion that mind and brain are composed of different physical material. Instead, it means simply that one cannot use the physical rules from the cellular level to completely predict activity at the psychological level. By way of analogy, if you wanted to understand the text on this page, you could analyze the words by submitting their contents to an inorganic chemist, who could ascertain the precise molecular composition of the ink. Yet no amount of chemical analysis could help you understand what these words mean, let alone what they mean in the context of the other words on the page.

It's no wonder, then, that some see neuroscientists as the "new high priests of the secrets of the psyche and explainers of human behavior in general." Will we one day replace government bureaucrats with neurocrats?

Scientists have made great strides in reducing the organizational complexity of the brain from the intact organ to its constituent neurons, the proteins they contain, genes, and so on. Using this template, we can see how human thought and action unfold at a number of explanatory levels, working upward from the most basic elements. At one of the lower tiers in this hierarchy is the neurobiological level, which comprises the brain and its constituent cells. Genes direct neuronal development; neurons assemble into brain circuits. Information processing, or computation, and neural network dynamics hover above. At the middle level are conscious mental states, such as thoughts, feelings, perceptions, knowledge, and intentions. Social and cultural contexts, which play a powerful role in shaping our thoughts, feelings, and behavior, occupy the highest landings of the hierarchy. Problems arise, however, when we ascribe too much importance to the brain-based explanations and not enough to psychological or social ones. Just as one obtains differing perspectives on the layout of a sprawling city while ascending in a skyscraper's glass elevator, we can gather different insights into human behavior at different levels of analysis.

The key to this approach is recognizing that some levels of explanation are more informative for certain purposes than others. This principle is profoundly important in therapeutic intervention. A scientist trying to develop a medication for Alzheimer's disease will toil on the lower levels of the explanatory ladder, perhaps developing compounds aimed at preventing the formation of the amyloid plaques and neurofibrillary tangles endemic to the disease. A marriage counselor helping a distraught couple, though, must work on the psychological level. Efforts by this counselor to understand the couple's problems by subjecting their brains to fMRIs could be worse than useless because doing so would draw attention away from their thoughts, feelings, and actions toward each other—the level at which intervention would be most helpful.

This discussion brings us back to brain scans and other representations of brain-derived data. What can we infer from this information about what people are thinking and feeling or how their social world is influencing them? In a way, imaging rekindles the age-old debate over whether brain equals mind. Can we ever fully comprehend the psychological by referring to the neural? This "hard problem," as philosophers call it, is one of the most daunting puzzles in all of scientific inquiry. What would the solution even look like? Will the parallel languages of neurobiology and mental life ever converge on a common vernacular?

Many believe it will. According to neuroscientist Sam Harris, inquiry into the brain will eventually and exhaustively explain the mind and, hence, human nature. Ultimately, he says, neuroscience will—and should—dictate human values. Semir Zeki, the British neuroscientist, and legal scholar Oliver Goodenough hail a "'millennial' future, perhaps only decades away, [when] a good knowledge of the brain's system of justice and of how the brain reacts to conflicts may provide critical tools in resolving international political and economic conflicts." No less towering a figure than neuroscientist Michael Gazzaniga hopes for a "brain-based philosophy of life" based on an ethics that is "…built into our brains. A lot of suffering, war, and conflict could be eliminated if we could agree to live by them more consciously."

It's no wonder, then, that some see neuroscientists as the "new high priests of the secrets of the psyche and explainers of human behavior in general." Will we one day replace government bureaucrats with neurocrats? Though short on details—neuroscientists don't say how brain science is supposed to determine human values or achieve world peace—their predictions are long on ambition. In fact, some experts talk of neuroscience as if it is the new genetics, that is, just the latest overarching narrative commandeered to explain and predict virtually all of human behavior. And before genetic determinism there was the radical behaviorism of B.F. Skinner, who sought to explain human behavior in terms of rewards and punishments. Earlier in the late nineteenth and twentieth centuries, Freudianism posited that people were the products of unconscious conflicts and drives. Each of these movements suggested that the causes of our actions are not what we

think they are. Is neurodeterminism poised to become the next grand narrative of human behavior?

As a psychiatrist and a psychologist, we have followed the rise of popular neuroscience with mixed feelings. We're delighted to see laypeople so interested in brain science, and we are excited by the promise of new neurophysiological discoveries. Yet we're dismayed that much of the media diet consists of "vulgarized neuroscience," as the science watchdog Neuroskeptic puts it, that offers facile and overly mechanistic explanations for complicated behaviors. We were both in training when modern neuroimaging techniques made their debut. The earliest major functional imaging technique (PET, or positron emission tomography) appeared in the mid-1980s. Less than a decade later, the near wizardry of fMRI was unveiled and soon became a prominent instrument of research in psychology and psychiatry. Indeed, expertise in imaging technology is becoming a sine qua non for graduate students in many psychology programs, increasing their odds of obtaining federal research grants and teaching posts and boosting the acceptance rates of their papers by top-flight journals. Many psychology departments now make expertise in brain imaging a requirement for their new hires.

The brain is said to be the final scientific frontier, and rightly so, in our view. Yet in many quarters brain-based explanations appear to be granted a kind of inherent superiority over all other ways of accounting for human behavior. We call this assumption "neurocentrism"—the view that human experience and behavior can be best explained from the predominant or even exclusive perspective of the brain. From this popular vantage point, the study of the brain is somehow more "scientific" than the study of human motives, thoughts, feelings, and actions. By making the hidden visible, brain imaging has been a spectacular boon to neurocentrism.

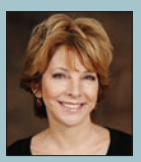
Consider addiction. "Understanding the biological basis of pleasure leads us to fundamentally rethink the moral and legal aspects of addiction," writes neuroscientist David Linden. This is popular logic among addiction experts, but to us, it makes little sense. Granted, there may be good reasons to reform the way the criminal justice system deals with addicts, but the biology of addiction is not one of them. Why? Because the fact that addiction is associated with neurobiological changes is not, in itself, proof that the addict is unable to choose. Just look at American actor Robert Downey Jr. He was once a poster boy for drug excess. "It's like I have a loaded gun in my mouth and my finger's on the trigger, and I like the taste of gunmetal," he said. It seemed only a matter of time before he would meet a horrible end. But Downey entered rehab and decided to change his life. Why did Downey use drugs? Why did he decide to stop and to remain clean and sober? An examination of his brain, no matter how sophisticated the probe, could not tell us why and perhaps never will. The key problem with neurocentrism is that it devalues the importance of psychological explanations and environmental factors, such as familial chaos, stress, and widespread access to drugs, in sustaining addiction.

Brain imaging and other neuroscience techniques hold enormous potential for elucidating the neural correlates of everyday decisions, addiction, and mental illness. Yet these promising new technologies must not detract from the importance of levels of analysis other than the brain in explaining human behavior. Ours is an age in which brain research is flourishing—a time of truly great expectations. Yet it is also a time of mindless neuroscience that leads us to overestimate how much neuroscience can improve legal, clinical, and marketing practices, let alone inform social policy. Naive media, slick neuroentrepreneurs, and even an occasional overzealous neuroscientist exaggerate the capacity of scans to reveal the contents of our minds, exalt brain physiology as inherently the most valuable level of explanation for understanding behavior, and rush to apply underdeveloped, if dazzling, science for commercial and forensic use.

Granted, it is only natural that advances in knowledge about the brain make us think more mechanistically about ourselves. But if we become too carried away with this view, we may impede one of the most challenging cultural projects looming in the years ahead: how to reconcile advances in brain science with personal, legal, and civic notions of freedom.

The neurobiological domain is one of brains and physical causes. The psychological domain, the domain of the mind, is one of people and their motives. Both are essential to a full understanding of why we act as we do and to the alleviation of human suffering. The brain and the mind are different frameworks for explaining experience. And the distinction between them is hardly an academic matter; it bears crucial implications for how we think about human nature, personal responsibility, and moral action. ■

This article is adapted from the authors' new book, *Brainwashed: The Seductive Appeal of Mindless Neuroscience* (Basic Books, 2013). Extensive notes for this article (five pages) can be found in the book.



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Why Being Human Makes Evolution Hard to Understand

Our difficulty accepting evolution isn't just because some religions oppose it or that it is complicated—it isn't. The problem may be a result of how our minds work.

CAMERON M. SMITH

Despite wide news coverage of evolution in recent years, and the fact that in January 2008 a leading science journal, *Nature*, declared evolution a fact, "Darwin's Dangerous Idea" remains fundamentally misunderstood in the popular media. Even on otherwise great TV shows, like BBC's *Life*, I've heard evolution misrepresented with scripting that propagates certain myths about the evolutionary process: in TV land, species struggle to climb the ladder of evolution to the pinnacle (occupied by humanity, of course); species live in ecosystems of perfect balance; living things are locked in combat for brute survival; and species are each nature's "solution," designed for a certain role in the great machinery of Nature.

A little bit of biology reveals that none of these misconceptions hold water, so how can as simple a process as evolution be so misrepresented? I don't think it's just a misunderstanding of how evolution works; tax form 1099 is more complicated than evolutionary principles. I don't think it's just because there are some common myths about how evolution works (though there are enough of these that I co-wrote a book—*The Top Ten Myths About Evolution*—to unveil them). And I don't think it's just a result of religiously based misinformation about evolution, though there's plenty of that (and always will be).

No, I think the widespread misunderstanding of evolution runs very deep. I think it has a lot to do with the way our minds work—with, basically, being human itself. That's because the essence of humanness is in the proactive making of things. I believe this proaction—quite unique in the animal kingdom—has conditioned the human mind to believe that complex phenomena (like plants and animals) must also be the result of proactive *making*.

To understand how we came to think this way, we can look to the stimulating new field of "cognitive archaeology."

Anthropology has shown that there are at least two meanings of humanness. "Anatomical modernity" is possessing a skeleton indistinguishable from that of modern humans, and we first see this in Africa by 100,000 years ago. The other meaning of humanness is "behavioral modernity," exhibiting behaviors essentially indistinguishable from those of modern humans, meaning complex symbolism and somewhat modern language. Though it's tough to spot archaeologically, there's decent consensus that this is also first seen in Africa, in symbolic artifacts dated to almost 80,000 years ago, and without question by 50,000 years ago. It's behavioral modernity that I'm concerned with here, and what it means for the mind—how we think—and why the way our minds work can make evolution hard to understand.

Proaction, Reaction, and the Invention of Invention

I argue that behavioral modernity is rooted in proaction and creation. Nonhuman life-forms change by an evolutionary process that is entirely reactive, and while some other animals do make and use tools, humans are entirely dependent on creating things—such as a stone tool, an igloo, or a Polynesian sailing vessel—to survive.

This is clear when we consider that evolution doesn't look forward. Nonhuman offspring of any parent generation are born into environments with bodies more or less identical to those of their parents, and therefore more or less suited to the environment in which their parents flourished. If the current environment is different from the parents' environment, the offspring can't do much about it. Certainly they don't change their bodies to adapt to the new environmental conditions, because they don't know that evolution is happening in the first place and because there's just no way to rapidly tailor the physical body to fit new environments. Although there is acclimatization (within boundaries referred to as the "reaction norm"), such change is largely not genetically encoded to be transmitted to the next generation; all that happens is that some offspring do better than others and some do worse, meaning that some live in better health and mate more commonly than others, sending the DNA that works for the *present* environment on to the *next* generation. And that's it; if the gene pool has been altered, evolution is occurring. Nonhuman evolution, it's easy to see, is reactive—just nonrandom differential survival of offspring born with bodies that worked in yesterday's environment; as evolutionist R.C. Lewontin put it in 1989, "The organism proposes; the environment disposes."[1]

But human evolution is very different. Humanity's trick—and it's a good one—is the ability to quickly adjust to any environmental pressure by inventing adaptations. Inventions can be artifacts, like a pair of warm boots, or complex behaviors, such as a dance that symbolically communicates how to hunt a particular animal. Whatever the invention, the point is that people thought it up; they perceived a problem and then designed a solution specific to that problem. And we don't just do it for fun—we live or die by our ability to buffer our frail bodies against an ev-

Humanity's trick—and it's a good one—is the ability to quickly adjust to any environmental pressure by inventing adaptations.

er-changing array of selective pressures. This has allowed human behavior to become largely decoupled from our biology, or at least not dictated by it, allowing us to survive and thrive globally not because of our bodies but despite them. And this capacity for inventing adaptations itself evolved; current cutting-edge theory suggests that at the heart of the broadly named "intelligence" we use to survive is the capacity for proactively adapting to new circumstances—creativity.[2] The appearance of this capacity is the appearance of a new variety of evolution; it is the evolution of evolution itself, and it is distinctive enough in the three-billion-plus years of Earth life that it has been considered one of the eight main transitions in the history of the evolutionary process.[3]

From all of this we can see that humanity's most useful adaptation has been the invention of invention. And from the day we learn that a peanut-butter-and-jelly sandwich doesn't just spontaneously assemble itself—that it must be assembled with intent (preferably by someone else)—it seems obvious that all of the other things we see in the world (or at least those at least as complex as a peanut-butter-and-jelly sandwich) were similarly assembled with intent. An acorn, for example, or a sturgeon: each is such a wonder of design (you try to make one!) that we feel they must have been made, with intent, as humans make things with intent. Superficially this seems reasonable enough and it has been the basis of the "Argument from Design" since the early nineteenth century, when William Paley wrote about the obviousness of design in nature in *Natural Theology*: "Upon the whole; after all the schemes and struggles of a reluctant philosophy [to explain complex things], the necessary resort is to a Deity. The marks of design are too strong to be gotten over. Design must have had a designer. That designer must have been a person. That person is GOD."[4]

In this way, Paley and adherents of his view think, technically, like children who inhabit a small bubble of space and time perception. Assuming that things are designed, they must have a designer.

This argument is likely familiar to readers of Skeptical Inquirer, but here I'm not interested in examining its logical foundations (that has been thoroughly done) so much as its psychological foundations; that is, *why* Paley was compelled to argue this way. Obviously it is partly a result of two thousand years of the Christian church channeling the Western mind into theological interpretations, but I think there's more to it than that. I think it also has to do with the long history of proactive making that has supported our genus since the origins of behavioral modernity. Humanity has been intentionally making things to survive for at least two million years, and that familiarity with proaction has stamped us to intuitively interpret "complex design" as necessarily the result of similar proaction. Here we draw the issue to its sharpest point: What do I mean when I say that this proaction has "stamped" us to think in a particular way? The mechanism is unclear, but the effects are real. In a review of studies of child psychology, Boston University psychologist Deborah Kelemen found that children "teleologically treat objects [and natural phenomena] as 'for' a single privileged function" and, furthermore, that by six- to ten-years-old they "reason about non-natural agents' mental states…and view objects in terms of design."[5] How much of this "intuitive theism" is instinctual and how much is culturally conditioned is unknown, but the pattern is clear.

In this way, Paley and adherents of his view think, technically, like children who inhabit a small bubble of space and time perception. Assuming that things are designed, they must have a designer. This is compelling in the face of almost incomprehensible complexity in nature, but only if we do not take the time to look closely at that complexity. For example, what we see—say, a mature oak tree—appears to be a "finished product" until we open our eyes to a time dimension (one barely accessible to Paley and his supporters), which reveals that complexity today might well have been passively assembled over a long period rather than purposively composed in a flash of inspiration. We can open and examine a spatial dimension as well to look carefully even at the molecules of DNA that direct the construction of amino acids into proteins and proteins into tissues that compose the whole, from bark to leaf. Such wedges between "common sense" and an evolutionary perspective—wedges between technically childish and scientifically educated thinking—have only come up recently in civilization, particularly in the last century and a half of modern evolutionary science.

Where did this capacity to appreciate the space and time dimensions and phenomena that actually account for the complexity of living things come from? As I mentioned before, it evolved, and in ways that we are starting to understand today.

Teflon, Velcro, and the Modern Human Mind

The origins of the creatively adaptive mind of our genus lie in the evolution of new memory systems in the brain and information-processing capacities of the mind,[6] and much of this played out in the evolution of language. While other animals certainly communicate, humans use many complex rules to exchange large amounts of information with great subtlety, at high speed, and with relatively few errors. What is most distinctive about human language, however, is the nature of its symbols, which actively promote invention.

Nonhuman primate communication uses the simplest kind of symbolism, as when a monkey gives an "aerial predator" screech or "ground predator" hoot, eliciting the proper defensive behaviors from their companions. These vocalizations are symbols because the sounds are arbitrary and they "mean" something else; a high screech signifies an aerial predator, while a low hoot signifies a ground predator. What is most interesting about these communications is that they're very simple; I call these "Teflon" because nothing sticks to them. The aerial predator screech can only ever mean aerial predator. The symbol to symbolized ratio is 1:1.

In the most profound contrast, humans "stick" concepts together, making more complex messages; this is what I call "Velcro" symbolism, because one symbol sticks to the next. For example, we might say, "Watch out for that guy; he's a real snake!" With human language, the symbol to symbolized ratio is 1:n because any word can be used to mean anything else we choose. The sound used to indicate "snake" can now describe the characteristics of a person. Somewhere in the evolution of our minds, our lineage broke some kind of barrier such that symbols were no longer concretely attached to one another; anything could mean anything. That "somewhere" is currently being intensively investigated.

What's the advantage of such complex language, of "Velcro" symbolism? At the very least, it allows a better "fit" between the individual (or group) and his or her world. Simple, slavish reactions to alarms that mean "Climb, fast!" (ground predator) or "Drop fast!" (aerial predator) may be wasteful and unnecessary. But subtler messages made a better fit of action to environment. And the increased complexity of the human language system allowed more (and more detailed) information to be communicated rapidly; knowledge is power, and this is how human behavior became decoupled from its anatomy and how humanity survives despite rather than because of our physical frames. "Velcro" symbolism is also what really distinguishes humans from other animals, and from its origin—at least 50,000 years ago—humanity has been *making* things (including sentences) with conscious intent. Even receiving a message requires deciphering exactly what the other person really meant as opposed to (perhaps) what they actually said, so even the act of *interpretation*, shaped by the knowledge of intended creation by the other party, is itself purposive *creation* close to the very heart of humanness.

So, from the beginning of what we can call behavioral modernity over 50,000 years ago, we humans have been thinking about and interpreting the world as though it were made by intent, at least partly because we as a species evolve by "rolling creation," a microsecond-by-microsecond flow of creation of meaning and even novel assembly of matter.

Creativity and the Understanding of Evolution

Creating, making, inventing, building, imagining—everything from stone tools to poems—are proactive human acts. Our mythologies are full of creation and we venerate exceptional creators. There is no end to human creation so long as there are minds capable of sticking ideas and words together in new ways. Without this ability we would be as interchangeable as insects, reacting (and that unknowingly) to natural selection rather than inventing ways to avoid it.

Creativity and proactively creating are at the heart of humanness, and when we think childishly we find it hard to understand that evolution is not, also, a result of proaction. But with maturity we understand that nonhuman evolution isn't actually a *thing* but the completely unintended *consequence* of three independent, factual, and observable processes (replication of life-forms; variation in offspring; selection among offspring).[7] This gives us a far richer understanding of how the natural world works, and how all these wonderful slime molds, birches, Venus flytraps, jellyfish, and every other living thing, actually came to be. ■

Notes

1. See p. 276 of Lewontin, R.C. 1983. Gene, organism and environment. In Bendall, D.S. (ed). 1983. *Evolution from Molecules to Men*. Cambridge, Cambridge University Press, pp. 273–285.

2. For example, see Gabora, L. 2010. Revenge of the 'neurds': Characterizing creative thought in terms of the structure and dynamics of human memory. *Creativity Research Journal 22*(1):1–13.

3. Szathmary, E. and J.M. Smith. 1994. The major evolutionary transitions. *Nature* 374: 227–232.

4. Paley, G. 1881. *Natural Philosophy*. New York: American Tract Society.

5. Kelemen, D. 2004. Are children 'intuitive theists'? Reasoning about purpose and design in nature. *Psychological Science* 15: 295–301.

6. For more on this topic, see Smith, C.M. 2006. Rise of the modern mind. *Scientific American MIND* August/September 2006: 32–39.

7. For an update to modern evolutionary theory see Smith, C.M., and J. Ruppell. 2012. What anthropologists should know about the new evolutionary synthesis. *Structure and Dynamics* 5(2). Available online at http://www.escholarship.org/uc/item/18b9f0jb.

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Six Signs of Scientism: Part 1

"Scientism" refers to a too uncritically deferential attitude toward science. In this first part of her two-part article, Professor Haack identifies the first three of six signs of scientism: using words like "science," "scientific," etc., honorifically; adopting scientific trappings purely decoratively; and preoccupation with the "problem of demarcation."

SUSAN HAACK

A man must be downright crazy to deny that science has made many true discoveries.

—C.S. Peirce (1903)[1]

Scientism . . . employs the prestige of science for disguise and protection.

—*A.H. Hobbs* (1953)[2]

Science is a good thing. As Francis Bacon foresaw centuries ago, when what we now call "modern science" was in its infancy, the work of the sciences has brought both light, an ever-growing body of knowledge of the world and how it works, and fruit, the ability to predict and control the world in ways that have both extended and improved our lives. But, as William Harvey complained, Bacon really did write about science "like a Lord Chancellor"[3]—or, as we might say today, "like a promoter," or "like a marketer." Certainly he seems to have been far more keenly aware of the virtues of science than of its limitations and potential dangers.

Yet science is by no means a *perfectly* good thing. On the contrary, like all human enterprises, it is ineradicably fallible and imperfect. At best, progress in the sciences is ragged, uneven, and unpredictable; moreover, much scientific work is unimaginative or banal, some is weak or careless, and some is outright corrupt; and scientific discoveries often have the potential for harm as well as for good—for knowledge *is* power, as Bacon saw, and power can be abused. And, obviously, science is by no means the *only* good thing, nor—only a little less obviously—even the only good form of inquiry. There are many other valuable kinds of human activity besides inquiry—music, dancing, art, storytelling, cookery, gardening, architecture, to mention just a few; and many other valuable kinds of inquiry—historical, legal, literary, philosophical, etc.

As I indicated by giving *Defending Science—Within Reason*[4] its subtitle, *Between Scientism and Cynicism*, we need to avoid *both* underestimating the value of science *and* overestimating it. What I meant by "cynicism" in this context was a kind of jaundiced and uncritically critical attitude toward science, an inability to see or an unwillingness to acknowledge its remarkable intellectual achievements, or to recognize the real benefits it has made possible. What I meant by "scientism" was the opposite failure: a kind of over-enthusiastic and uncritically deferential attitude toward science, an inability to see or an unwillingness to acknowledge its fallibility, its limitations, and its potential dangers. One side too hastily dismisses science; the other too hastily defers to it. My concern here, of course, is with the latter failing.

It is worth noting that the English word "scientism" wasn't always, as it is now, pejorative. In the mid-nineteenth century—not long after the older, broader use of the word "science," in which it could refer to any systematized body of knowledge, whatever its subject matter, had given way to the modern, narrower use in which it refers to physics, chemistry, biology, and so on, but not to jurisprudence, history, theology, and so forth[5]—the word "scientism" was neutral: it meant, simply, "the habit and mode of expression of a man of science." But by the early decades of the twentieth century "scientism" had begun to take on a negative tone—ini-

tially, it seems, primarily in response to over-ambitious ideas about how profoundly our understanding of human behavior could be transformed by applying the methods that had proven so successful in the physical sciences.[6] And by the mid-twentieth century, scientism had come to be seen as a "prejudice,"[7] a "superstition,"[8] an "aberration" of science.[9] By now this negative tone is predominant;[10] in fact, the pejorative connotations of "scientism" are so thoroughly entrenched that defenders of the autonomy of ethics, or of the legitimacy of religious knowledge, etc., sometimes think it sufficient, instead of actually engaging with their critics' arguments, to dismiss them in a word: "scientistic."

So, as the term "scientism" is usually currently used, and as I shall use it, it is a trivial verbal truth that scientism should be avoided. It is, however, a substantial question exactly when, and why, deference to the sciences is appropriate and when, and why, it is inappropriate or exaggerated. My primary purpose here is to suggest some ways to recognize when this line has been crossed, when respect for the achievements of the sciences has transmuted into the kind of exaggerated deference characteristic of scientism. These are the "six signs of scientism" to which my title alludes. Summarized briefly and roughly, they are:

- Using the words "science," "scientific," "scientifically," "scientist," etc., honorifically, as generic terms of epistemic praise.
- Adopting the manners, the trappings, the technical terminology, etc., of the sciences, irrespective of their real usefulness.
- A preoccupation with demarcation, i.e., with drawing a sharp line between genuine science, the real thing, and "pseudoscientific" imposters.
- A corresponding preoccupation with identifying the "scientific method," presumed to explain how the sciences have been so successful.
- Looking to the sciences for answers to questions beyond their scope.
- Denying or denigrating the legitimacy or the worth of other kinds of inquiry besides the scientific, or the value of human activities other than inquiry, such as poetry or art.

Here, I will explain the first three of these six signs (leaving the fourth, fifth and sixth to Part 2)—always trying, however, to keep their interrelations in sight, to signal the mistaken ideas about the sciences on which they depend, and to steer the sometimes very fine line between candidly repudiating scientism, and surreptitiously repudiating science.

The Honorific Use of "Science" and Its Cognates

Over the last several centuries, the work of the sciences has enormously enriched and refined our knowledge of the world. And as the prestige of the sciences grew, words like "science," "scientifically," etc., took on an honorific tone: their substantive meaning tended to slip into the background, and their favorable connotation began to take center stage. Advertisers routinely boast that "science has shown" the superiority of their product, or that "scientific studies" support their claims. Traditional or unconventional medical treatments are often dismissed out of hand, not as ill-founded or untested, but as "unscientific." Skeptical of some claim, we may ask, not "Is there any *good* evidence for that?" but "Is there any *scientific* evidence for that?" Needing to craft a test to help judges determine whether expert testimony is reliable enough to be admitted, the U.S. Supreme Court suggests that such testimony must be "scientific knowledge," arrived at by the "scientific method."[11] A historian arguing that there is no foundation in the evidence for the idea that ancient Greek philosophy was borrowed from the Egyptians describes this idea as "unscientific."[12] The titles of conferences and books speak of "Science and Reason,"[13] as if the sciences had a monopoly on reason itself. An editorial in the *Wall Street Journal* describes studies of charter schools where students are chosen by lottery as "scientific and more reliable" than studies of schools that select their students on merit.[14] The honorific usage is ubiquitous.

Naturally enough, once "science," "scientific," etc., have become honorific terms, practitioners uneasy about the standing of their discipline or approach like to use them emphatically and often.

Naturally enough, once "science," "scientific," etc., have become honorific terms, practitioners uneasy about the standing of their discipline or approach like to use them emphatically and often. In 1953, Prof. Hobbs provided a splendid list of excerpts from publishers' blurbs for sociology texts: "a scientific approach"; "scientifically faces the problems of . . . marriage"; "approaches social problems from the . . . scientific point of view . . . unassailable [conclusions]"; "sternly scientific"; and so on and on.[15] And nowadays, of course—though departments of physics and chemistry feel no need to stress

that what *they* do is science—universities offer classes and degrees in "Management Science," "Library Science," "Military Science," and even "Mortuary Science."[16]

But this honorific usage of "science" and its cognates leads to all kinds of trouble. It makes it all too easy to forget that, remarkable as the achievements of the natural sciences have been, not all, and not only, scientists are good, thorough, honest inquirers. It tempts us to dismiss bad science as not really science at all, and it seduces us into the false assumption that whatever is *not* science is no good, or at any rate inferior. Yes, the best scientific work is a remarkable human cognitive achievement; but even this best scientific work is fallible, and there is plenty of good, solid work in non-scientific disciplines such as history, legal scholarship, music theory, etc.—not to mention the vast body of practically useful knowledge accumulated by farmers, sailors, ship-builders, and artisans of every kind, and the considerable resources of knowledge of herbs embodied in traditional medical practices.[17]

And, inevitably, the honorific use of "science" encourages uncritical credulity about whatever new scientific idea comes down the pike. But the fact is that all the explanatory hypotheses that scientists come up with are, at first, highly speculative, and that most are eventually found to be untenable, and abandoned. To be sure, by now there is a vast body of well-warranted scientific theory, some of it *so* well-warranted that it would be astonishing if new evidence were to show it to be mistaken—though even this possibility should never absolutely be ruled out. (Rigid dogmatism is always epistemologically undesirable, rigid dogmatism about even the best-warranted scientific theory included.) But this vast body of well-warranted theory is the surviving remnant of a much, much vaster body of speculative conjectures, most of which came to nothing—a fact bound to be obscured if we use "scientific" more or less interchangeably with "reliable, established, solid," and so forth.

This kind of misuse of scientific tools and techniques is even commoner in the social sciences, where, as Robert Merton puts it, practitioners only too often "take the achievements of physics as the standard of self-appraisal. They want to compare biceps with their bigger brothers.

Inappropriately Borrowed Scientific Trappings

Besides encouraging the honorific use of "science" and its cognates, the successes of the natural sciences have also tempted many to borrow the manners and the trappings of these fields, in hopes of looking "scientific"—as if technical terminology, numbers, graphs, tables, fancy instruments, etc., were enough by themselves to guarantee success. When Friedrich von Hayek wrote of the "tyranny" that "the methods and technique of the Sciences . . . have exercised . . . over . . . other subjects"[18] he had in mind social scientists' efforts to look as much as possible like physicists—despite their radically different subject matters. And there certainly *is* something objectionably scientistic about adopting the trappings associated with physics, chemistry, etc., not as useful transferable tools but as a smoke-screen hiding shallow thinking or half-baked research.

Even those who work in disciplines no one would hesitate to classify as science sometimes focus too much on form and too little on substance. Epidemiologists testing the side-effects of a morning-sickness drug meticulously calculate the statistical significance of their results, but fail to distinguish women who took the drug during the period of pregnancy when fetal limbs were forming from those who took it later;[19] a medical scientist offers impressive-looking tables of cases, but fails to check whether the information in the tables matches the information in the text.[20] And so forth.

But this kind of misuse of scientific tools and techniques is even commoner in the social sciences, where, as Robert Merton puts it, practitioners only too often "take the achievements of physics as the standard of self-appraisal. They want to compare biceps with their bigger brothers."[21] Those lengthy introductory chapters on "methodology" in sociology texts are sometimes only window-dressing; and, more often than one would like, the graphs, tables, and statistics in social-science work focus attention on variables that can be measured at the expense of those that really matter, or represent variables so poorly defined that *no* reasonable conclusion can be drawn. David Abrahamson's Second Law of Criminal Behavior is a classic example: "A criminal act is the sum of a person's criminalistic tendencies plus his total situation, divided by the amount of his resistance," or: "C = (T+S)/R."[22] The highly mathematical character of contemporary economic theory has contributed to the curious idea that economics is the "queen of the social sciences"—a title to which

psychology would seem to have a much more legitimate claim. But too often those elegant mathematical models turn out to be based on assumptions about "rational economic man" true of no real-world economic actors.[23] And, sadly, policy recommendations based on flawed sociological statistics or flawed economic models often acquire an undeserved status because they are perceived as "science-based."

Inappropriately borrowed scientific trappings are also common in philosophy, where, for example, many journals and publishers have adopted such practices as the name-date-page-number style of reference used by psychologists, sociologists, etc., and their preference for the most recent rather than the original dates (which can be misleading even on its own turf, and is inherently more so in a discipline where reliance on authority is wholly out of place, and catastrophic when the historical development of an idea matters). Even giving priority to peer-reviewed publication, another practice adopted from the sciences, is a kind of scientism; peer review, hardly perfect as a rationing device even for scarce space in scientific journals,[24] is inherently more susceptible to corruption the more a profession is dominated, as philosophy is, by cliques, parties, and schools. And in philosophy as in the social sciences, technical terminology is often not, as it could and should be, a carefully-crafted sign of hard-won intellectual advance, but only self-important jargon designed to attract others to (what you hope will be) a bandwagon.

None of this is to deny, of course, that sometimes scientific tools and techniques turn out also to be genuinely useful to inquirers in other fields: historians use a cyclotron to determine whether the composition of the ink in two earlier printed versions of the bible was the same as that in the "Gutenberg Bible" of 1450–1455;[25] they use DNA identification techniques to test the hypothesis that Thomas Jefferson was the father of the children born to his house-slave Sally Hemings;[26] and even borrow medical imaging devices to distinguish the traces of writing on the lead "postcards" on which Roman soldiers wrote home from the marks of centuries of weathering;[27] General Motors uses a model designed by the Centers for Disease Control to track an "epidemic" of defects in its cars and trucks.[28] And so on. What is scientistic is not borrowing scientific tools and techniques, as such, but borrowing them for display rather than for serious use.

In philosophy as in the social sciences, technical terminology is often not, as it could and should be, a carefully-crafted sign of hard-won intellectual advance, but only self-important jargon designed to attract others to (what you hope will be) a bandwagon.

Preoccupation with "the Problem of Demarcation"

Once "scientific" has become an honorific term, and when scientific trappings only too often disguise a lack of real rigor, it is almost inevitable that the "problem of demarcation," i.e., of drawing the line between genuine science and pretenders, and with identifying and rooting out "pseudoscience," will loom much larger than it should.

Not surprisingly, as the honorific use of "science" began to take hold in the early decades of the twentieth century, so too did an increasing preoccupation with demarcation: in logical positivism (where a key theme was the demarcation of empirically meaningful scientific work from high-flown but meaningless metaphysical speculation); and, most strikingly, in Karl Popper's philosophy of science.[29] The positivists had proposed *verifiability* as the mark of the *empirically meaningful*; Popper turned this on its head. Noting that, while no finite number of positive instances could show an unrestricted universal statement true, a single counter-instance is enough to show it false, Popper proposed *falsifiability*, *testability*, or (as he also says) *refutability* as the criterion of demarcation of the genuinely *scientific*.[30] A real scientific theory, according to Popper, can be subjected to the test of experience and, if it is false, can be shown to be false; while a theory that rules nothing out is not a scientific theory at all.

This sounds simple enough. But in fact it never became entirely clear what, exactly, Popper's criterion was, nor what, exactly, it was intended to rule out, nor, most to the present purpose, what exactly—besides the honorific use of "science"—the motivation was for wanting a criterion of demarcation in the first place; in fact, it became increasingly *un*clear. For example, initially it sounded as if Popper intended to exclude Marxist "scientific socialism," along with Freud's and Adler's psychoanalytic theories, as unfalsifiable. But in *The Open Society and Its Enemies* (1945) Popper grants that, after all, Marxism *is* falsifiable—in fact, he tells us, it was falsified by the events of the Russian revolution.[31] What went wrong wasn't, after all, that the theory was unfalsifiable, but that instead of abandoning their theory in the face of contrary evidence, Marxists made *ad*

hoc modifications to save it. So Popper's supposedly logical criterion was transformed into a partly methodological test—a test, moreover, according to which badly conducted science isn't really science at all.

Again, for a long time Popper claimed that his criterion of demarcation excluded the theory of evolution; which, he wrote, is not a genuine scientific theory but a "metaphysical research programme."[32] Then he changed his mind: evolution *is* science, after all.[33] And again—quietly shifting from writing of falsifiability as a criterion of the scientific to suggesting that it is a criterion of the empirical—Popper acknowledged that the category of "non-science" includes not only pseudoscience, but also such legitimate but non-empirical areas of inquiry as metaphysics and mathematics.[34] By the time you notice that he describes his criterion as a "convention,"[35] and even, in the introduction to the English edition of *The Logic of Scientific Discovery*, writes that scientific knowledge is continuous with everyday empirical knowledge,[36] you can hardly avoid the conclusion that the apparently simple idea with which he started soon became something of an intellectual monster.

With the benefit of hindsight, it looks as if Popper's criterion of demarcation proved so attractive to so many in part because it was amorphous (or rather, polymorphous) enough to seem to serve a whole variety of agendas—including federal courts' interest in distinguishing reliable scientific testimony from "junk science,"[37] or in determining whether "creation science" is really science, and hence may constitutionally be taught in public high schools.[38] Other criteria of demarcation have been proposed: that real science relies on controlled experiments, for example (which, however, would rule out not only anthropology and sociology, but also—most implausibly of all—astronomy). But the fact is that the term "science" simply *has no* very clear boundaries: the reference of the term is fuzzy, indeterminate and, not least, frequently contested. The best we might hope for is a list of "signs of scientificity," none of which would be shared by all sciences, but each of which would be found, in some degree, in some sciences.

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This is not to say that we can't, in a rough and ready way, distinguish between the sciences and other human activities, including other human cognitive activities, but it is to say that any such distinction can *only* be rough and ready. I might say, as a first approximation, that science is best understood not as a body of knowledge, but as a kind of inquiry; so that cooking dinner, dancing, or writing a novel isn't science, nor is pleading a case in court. At a second approximation, I would add that, since the word "science" has come to be tied to inquiry into empirical subject-matter, formal disciplines like logic or pure mathematics don't qualify as sciences, nor normative disciplines like jurisprudence or ethics or aesthetics or epistemology. And at a third approximation, to acknowledge that the work picked out by the word "science" is far from uniform or monolithic, it makes sense to say, rather, that the disciplines we call "the sciences" are best thought of as forming a loose federation of interrelated kinds of inquiry into empirical questions.

But if we want to get a clear view of the place of the sciences among the many kinds of inquiry, of the place of inquiry among the many kinds of human activity, and of the interrelations among the various disciplines classified by deans and librarians as sciences, we will need to look for continuities as well as differences. For there are marked affinities between (as we say) "historical" sciences like cosmology and evolutionary biology, and what we would ordinarily classify simply as historical inquiry. There is no sharp boundary between psychology and philosophy of mind, nor between cosmology and metaphysics. Nor is there any very clear line between the considerable body of knowledge that has grown out of such primal human activities as hunting, herding, farming, fishing, building, cooking, healing, midwifery, child-rearing, etc., and the more systematic knowledge of agronomists, child psychologists, etc.

Scientific inquiry is recognizably continuous with more commonplace and less systematic kinds of empirical inquiry: inquiry into the causes of spoiled crops, the design of fishing boats, the medicinal properties of herbs, etc. It is more systematic, more refined, and more persistent; but sometimes it rediscovers, and builds on, traditional knowledge. Linnaeus, for example, built on traditional Lap taxonomies of plants and animals;[39] many drugs now part of the arsenal of modern scientific medicine were derived from what were originally folk remedies. An example would be digitalis, extracted from a plant called the foxglove. Long used as a folk remedy, digitalis was first named in 1542; its clinical properties were first

described by William Withering in 1785, and by the mid-twentieth century it was in common use by physicians for the treatment of heart ailments.[40]

Suppressing the demarcationist impulse enables us to see the Popperian requirement that a theory rule something out, that it not be compatible with absolutely *anything* and *everything* that might happen, for what it really is: a mark, not of its being scientific specifically, but of its being genuinely explanatory. And willingness to take contrary evidence seriously can also be seen for what it really is: a mark not, as Popper supposes, of the scientist specifically, but of the honest inquirer in whatever field. (The historian who ignores or destroys a document that threatens to undermine his favored hypothesis is guilty of just the same kind of intellectual dishonesty as the scientist who ignores or fails to record the results of an experiment that threatens to falsify his theory.) "Scientism," as Hayek shrewdly observes, confuses "the general spirit of disinterested inquiry" with the methods and language of the natural sciences.[41]

And suppressing the demarcationist impulse will also have the healthy effect of obliging us to recognize poorly conducted science as just that, poorly conducted *science*; and of encouraging us, instead of simply sneering at "pseudoscience," to specify what, exactly, is wrong with the work we are criticizing: perhaps that it is too vague to be genuinely explanatory; perhaps that, though it uses mathematical symbolism or graphs or fancy instruments, these are purely decorative, and doing no real work; perhaps that claims which are thus far purely speculative are being made as confidently as if they were well-warranted by evidence; and so on. If we still had a use for the term "pseudoscience," it might be best reserved to refer to such public-relations exercises as the Creation Science "movement"—what a revealing word!—which, so far as I can tell, involves no real inquiry of any kind. ■

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35. *Id.*, p.37.
36. *Id.*, p.18.
37. *Daubert* (1993) (n.11). Though the Supreme Court doesn't realize this, it is hard to think of a philosophy of science less suitable than Popper's, which expressly *denies* that any scientific theory is ever shown to be reliable, to serve as a criterion of reliability.
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The Valentich Disappearance: Another UFO Cold Case Solved

What did he see? The missing piece of the puzzle in a strange 'UFO' case involving the crash of a young pilot off Australia has been identified.

JAMES McGAHA and JOE NICKELL

What is known as the "Valentich disappearance" is a strange occurrence in the annals of UFOlogy, one never satisfactorily explained—until now. One of us (Nickell) was asked to look into the case for a television show, and he queried the other (McGaha) who came up with the missing piece of the puzzle (as perhaps only someone who was both a pilot *and* astronomer could do).

The story begins in Australia about 19:00 hours (7:00 PM), or shortly after sunset (6:43 PM), on October 21, 1978. A young man named Frederick "Fred" Valentich—who had left Victoria's Moorabbin airport at 18:19 (6:19 PM)—was piloting a light airplane, a rented single-engine Cessna 182L (registration VH-DSJ) over Bass Strait, heading southeastwardly for King Island. When what he thought was another aircraft seemed to pass over him, he radioed Melbourne Air Flight Service, and spoke with controller Steve Robey. Here is the (slightly abridged) exchange (with punctuation and capitalization added), taken from the transcript of the audiotape (beginning at 19:06:14):

Valentich: Is there any known traffic below five thousand [feet]?
Robey: No known traffic.
V: I am—seems [to] be a large aircraft below five thousand.
R: What type of aircraft is it?
V: I cannot affirm. It is [sic] four bright, it seems to me like landing lights. . . . The aircraft has just passed over me at least a thousand feet above.
R: Roger, and it, it is a large aircraft? Confirm.
V: Er, unknown due to the speed it's traveling. Is there any Air Force aircraft in the vicinity?
R: No known aircraft in the vicinity.
V: It's approaching right now from due east towards me. . . . [Silence for 2 seconds.] It seems to me that he's playing some sort of game. He's flying over me two, three times, at a time at speeds I could not identify.
R: Roger. What is your actual level?
V: My level is four and a half thousand. Four five zero zero.
R: And confirm you cannot identify the aircraft.
V: Affirmative.
R: Roger. Stand by.
V: It's not an aircraft. It is—[Silence for 2 seconds.]
R: Can you describe the, er, aircraft?
V: As it's flying past, it's a long shape. [Silence for 3 seconds.] [Cannot] identify more than [that it has such speed]. [Silence for 3 seconds.] [It is] before me right now, Melbourne.
R: And how large would the, er, object be?
V: It seems like it's stationary.[1] What I'm doing right now is orbiting, and the thing is just orbiting on top of me also. It's got a green light and sort of metallic. [Like] it's all shiny [on] the outside. [Silence for 5 seconds.] It's just vanished. . . . Would you know what kind of aircraft I've got? Is it military aircraft?
R: Confirm the, er, aircraft just vanished.
V: Say again.
R: Is the aircraft still with you?
V: [It's, ah, nor-] [Silence for 2 seconds.] [Now] approaching from the southwest. . . . The engine is, is rough idling. I've got it set at twenty three twenty four, and the thing is—coughing.
R: Roger. What are your intentions?
V: My intentions are, ah, to go to King Island. Ah, Melbourne, that strange aircraft is hovering on top of me again. [Silence for 2 seconds.] It is hovering, and it's not an aircraft. [Silence for 17 seconds, open microphone, with audible, unidentified staccato noise. End of transcript.] (*Aircraft Accident* 1982. See also Good 1988, 175–77; Chalker 1998, 964; Haines and Norman 2000; Baker 2000, 248)

Valentich with a Cessna, similar to the aircraft he disappeared in.

Some versions of the transcript fail to match that of the accident report in important details. For example, instead of "[It is] before me right now," one source (Chalker 2001, 629) gives ". . . coming for me right now."

The communication ended about 19:12:49. Although an intensive air, land, and sea search was carried out until October 25, no trace of the Cessna was found. An oil slick discovered on October 22, some eighteen miles north of King Island, "was not established as having any connection with Valentich's plane" (Good 1988, 178). The Bureau of Air Safety Investigation released its findings in May 1982, stating that "The reason for the disappearance of the aircraft has not been determined," but that the outcome was "presumed fatal" (*Aircraft Accident* 1982). Suicide? Staged disappearance? Alien attack or abduction? Drug runners' shootdown? Electrical discharge from a cloud igniting gas fumes? There were many "theories," including those of "psychics" (Chalker 1998, 966–67; "Valentich" 2013). However, none seemed to explain both the disappearance and the lights. To understand what happened, we need to look more closely at Fred Valentich.

Unfortunately, Valentich had failed all five of his exam subjects—not once but twice—and, just the month before, again failed three subjects. Further, his involvement in three flying incidents came to the attention of officials.

The Pilot

Fred Valentich was a twenty-year-old, inexperienced flyer with only about 150 total hours flying time and a class-four instrument rating (which meant he could operate at night but only "in visual meteorological conditions" [*Aircraft Accident* 1982]). He had twice been rejected by the Royal Australian Air Force, due to inadequate education. Having obtained a private pilot license in September 1977, he was studying part time for a commercial pilot's license.

Unfortunately, he had failed all five of his exam subjects—not once but twice—and, just the month before,

again failed three subjects. Further, his involvement in three flying incidents came to the attention of officials: once he received a warning for having strayed into restricted air space, and twice he was cited for deliberately flying blindly into a cloud, for which he was under threat of prosecution (Sheaffer 2013; "Valentich" 2013). In brief, Valentich may have been an accident waiting to happen.

Moreover, the young pilot was enthralled with UFOs, watching films and accumulating articles on the topic. Earlier that year, according to his father, Valentich had himself observed a UFO moving away very fast. And he had expressed to his father his worry about what could happen if such presumed extraterrestrial craft should ever attack (Sheaffer 2013; "Valentich" 2013). As we shall see, his deep belief in flying saucers may have contributed to his death—and not in the way some saucer buffs imagine.

Some thought Valentich might have staged his disappearance, but the evidence does not support that hypothesis (Good 1988, 180). Nevertheless Valentich did give two contradictory reasons for his flight to King Island: (1) to pick up some friends (as he told flight officials), or (2) to pick up crayfish. However, these reasons were found to be untrue (*Aircraft Accident* 1982; "Valentich" 2013). Valentich had not even followed standard procedure to inform King Island airport of his intent to land there ("Disappearance" 2013).

So what was Valentich really up to—in addition to wanting to log more hours of flying experience? Possibly he had decided to look for UFOs again but, rather than admit that, offered others more legitimate-sounding reasons for his flight. In short, he may not simply have encountered a UFO but instead went looking for one. If so, his "encounter" is not surprising. As a "True Believer," observes Robert Sheaffer (2013, 27), Valentich was "probably inclined to assume anything is a 'UFO' if he could not immediately identify it."

So what did the young pilot see? Having clear skies, he described four bright lights that he mistakenly (as he later admitted) first thought were an airplane's "landing lights" (that is, white points of light). They were above him and—except for his own movements (more on this later)—seemed to be just "hovering." Then twice and quite correctly, he realized "it" was definitely "not an aircraft."

So what did the young pilot see? Having clear skies, he described four bright lights that he mistakenly (as he later admitted) first thought were an airplane's 'landing lights' (that is, white points of light).

As it happens, a computer search of the sky for the day, time, and place of Valentich's flight reveals that the four points of bright light he would almost certainly have seen were the following: Venus (which was at its very brightest), Mars, Mercury, and the bright star Antares. These four lights would have represented a diamond shape, given the well-known tendency of viewers to "connect the dots," and so could well have been perceived as an aircraft or UFO. In fact, the striking conjunction was shaped as a vertically elongated diamond, thus explaining Valentich's saying of the UFO that "it's a long shape."

As to the UFO's other characteristics, the "metallic" or "shiny" appearance could have been due to the power of suggestion alone. Having connected the dots, Valentich would likely have gone on to fill in the area as solid, even "metallic." We must remember that Valentich's impressions are those of someone who was confused about what he was seeing.

The "green light" could have been part of this confusion also. Remember, Valentich's first description of the UFO involved only four bright white lights; he made no mention at that time of a green one. It could actually have been nothing more than the Cessna's own navigation light on its right wing tip. That green light—or its reflection on the windshield—could easily have been superimposed onto the UFO sighting.

A witness on the ground, who described having seen a green light just above Valentich's plane, had not mentioned that aspect of his story at the time. However, many years later—after the green light was made public—he did mention the detail, but he is only identified by a pseudonym. Nevertheless, he said (in the words of his interviewers) that "Its color was similar to the navigation lights on an airplane" (Haines and Norman 2000, 26)! If the Cessna was indeed close enough to the land as to be seen by the man and his two nieces, there is a simple explanation: that the airplane's attitude (a steep angle of bank) was such that its right wing tip was up, and so its green navigation light appeared above the Cessna. As the witness stated, the light was positioned "like it was riding on top of the airplane," and it kept a constant position, according to the witnesses (Haines and Norman 2000, 26). But again, there are problems with the main witness's description. As his interviewers acknowledge, his "recollection of the angular size of the airplane's lights is too large by perhaps several orders of magnitude" (Haines and Norman 2000, 28). (Incidentally, misreadings by amateur writers

have now converted Valentich's "green light" into multiple "green lights" [e.g., "Disappearance" 2013].)

But what about the UFO's movements when it was not "hovering"? It is now clear—since we have identified the UFO as probably a conjunction of four celestial lights—that it was not the UFO moving in relation to the plane but rather the opposite: the plane moving in relation to the stationary lights. There is actually evidence from the transcript that this is so. After the UFO has repeatedly seemed to fly over him, Valentich says, "What I'm doing right now is orbiting, and the thing is just orbiting on top of me."

This points to what was really happening to the poor inexperienced pilot. Distracted by the UFO, he may then have been deceived by the illusion of a tilted horizon. That can happen when the sun has gone down but still brightens part of the horizon, while, of course, the rest of it gets gradually darker farther away. This imbalance of lighting can cause the horizon to appear tilted, so that, in compensating by "leveling" the wings, the pilot inadvertently begins—not to orbit (circle), but to spiral downward—at first slowly, then with increasing acceleration.

At a most critical time therefore, when he should have been in fully alert mode, paying attention to his instruments, he was instead engaged in something that was extremely distracting: flying while excitedly focusing on, and talking about, a UFO. This, as we can now see, was a recipe for disaster. With Valentich succumbing to spatial disorientation, his plane (like that of young John F. Kennedy Jr. over two decades later) began what is aptly termed a "graveyard spiral."

Further corroboration of this may come from the pilot's statement that the engine was "rough idling"—just seconds away from his final contact. The plane's moving in a tightening spiral would cause an increase of G-forces with a consequent decrease in fuel flow, resulting in the engine's rough running. Or, at that point, the Cessna may have already inverted, producing the same effect because that plane had a gravity-fed fuel system.

Not surprisingly, Valentich's airplane going missing while he was radioing a UFO report prompted talk of extraterrestrials and abduction. Indeed, it spawned later reports of other UFOs allegedly seen on the night of the Cessna's disappearance. These provoked a skeptical Ken Williams, spokesperson of the Department of Transport, to tell a reporter, "It's funny all these people ringing up with UFO reports well after Valentich's disappearance" ("Pilot Missing" 1978).

Just a month after the disappearance, the pilot of another Cessna sighted the outline of what he believed was a submerged aircraft, but on another pass over, he was unable to confirm that observation (Good 1988, 178). Now thanks to yeoman's work by Australian researcher Keith Basterfield, who rediscovered the "lost" official case file, we have new information. As he explains, "parts of aircraft wreckage with partial matching serial numbers were found in Bass Strait five years after the disappearance." (Qtd. in Sheaffer 2013, 27.)

Fred Valentich's UFO has now been identified. That is, we can show that a group of four bright lights, consistent with his description, was within his sight at the time he was reporting his UFO. This is the long missing piece of the puzzle that awaited solving because the case required expertise from astronomy as well as aeronautics.

The identification underscores the inescapable fact that the disappearance was simply a fatal crash. Ironically, it might never have occurred but for the young pilot's fascination with UFOs. If not actually the reason for his evening flight, as we suspect, the fascination nevertheless was part of why it ended tragically.

We can now reread the transcript of the exchanges between Valentich and an air traffic controller with a new understanding. In our mind's eye we watch in horror as—distracted and disoriented—the young pilot unexpectedly enters the "graveyard spiral" that carries him to his death. ■

Acknowledgments

CFI Librarian Lisa Nolan provided considerable research assistance.

Note

1. Haines, using special filters, believes the word *stationary* is actually the phrase *chasing me* (Haines and Norman 2000, 24).

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THE JERSEY DEVIL: THE REAL STORY

The story of the Jersey Devil has become layered with myths and variations, obscuring the original events that gave rise to it. This is not surprising considering the story comes from colonial-era political intrigue, Quaker religious infighting, and a future Founding Father.

BRIAN REGAL

Most skeptics and students of the outré know the story of the Jersey Devil. Sometime in the early part of the eighteenth century in the New Jersey forest called the Pine Barrens, a woman known as Mother Leeds gave birth to her thirteenth child and cried out, "Oh, let this one be a devil!" The "child" arrived with horse-like head and bat-like wings. It yelped menacingly and flew up and out of the chimney, disappearing into the dark to spend the centuries accosting anyone unfortunate enough to encounter it. The commonly held story of the Jersey Devil bears no resemblance to any sort of reality, however. The story is one born not of a blaspheming mother, but of colonial-era political intrigues, Quaker religious in-fighting, almanac publishing, a cross-dressing royal governor, family reputations, and Benjamin Franklin.

There are legions of books and websites devoted to the Jersey Devil, but they rehash material or copy other websites without any attempt to verify sources or check original materials. If you looked to the historical record with the keyword of Jersey Devil, you would find little factual or reliable evidence. Reviews of newspapers, pamphlets, and broadsides from colonial New Jersey show no references to a Leeds Devil (see below) or anything like it. Reports of children killed by the creature or an attempt by a local clergyman to "exorcise" the Leeds Devil in the eighteenth century have no supporting documentation (also the central protagonists, the Quakers, did not perform exorcisms). As a result, the story of the Jersey Devil's origin has been shrouded in monster tales that obscure the far more interesting historical events. Here is a reassessment of the mythos.

Daniel Leeds

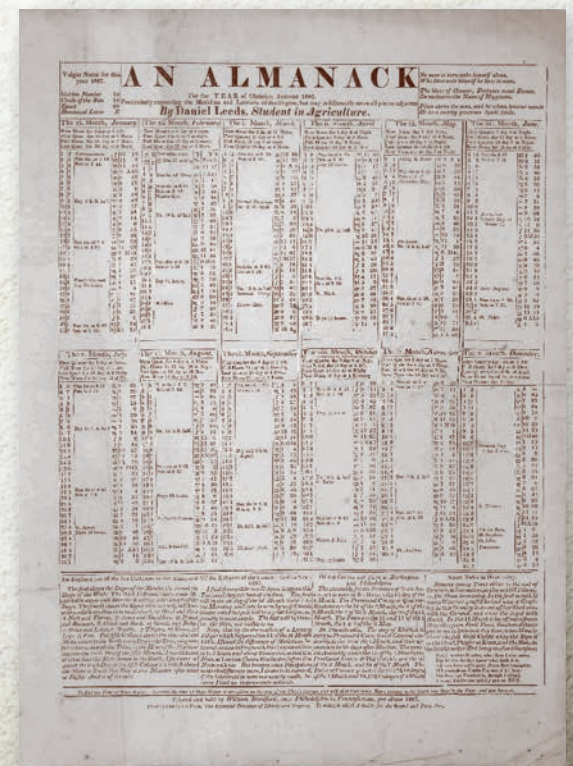
The European settlement of New Jersey, originally named Nova-Caesaria, began in the 1620s. Settlers came predominantly from England. They were mostly members of the religious order the Society of Friends, commonly called Quakers. They were delighted to discover large tracts of land all but empty of people nestled between Manhattan and Philadelphia. The first royal governor of New Jersey, Edward Hyde, Lord Cornbury (1661–1723), is remembered as one of the most vilified and hated governors of colonial America. He also stands accused of being a cross-dresser. A portrait believed to be Cornbury hangs in the New York Historical Society and shows him dressed as his aunt, Queen Anne. However, a recent reappraisal of his gubernatorial career shows there is little but slander and innuendo concerning Cornbury's cross-dressing. Regardless of whether Cornbury was a fiscal scoundrel or a cross-dresser, his connection to the Jersey Devil story is tangential but important.

When Lord Cornbury received his orders to take charge of New Jersey in 1702, the document included a list of his councilors, one of whom was Daniel Leeds (1651–1720). Born in Leeds, England, Daniel Leeds arrived in Burlington in 1677. A devout Quaker, he claimed to have had ecstatic visions as a young man. His first wife died while in England, so he married a second time in 1681. This wife, Ann Stacy, gave birth to a daughter, though neither survived the birth. He then married Dorothy Young, who also died, though not before producing eight children by 1699. He married a final time to Jane Abbot-Smout. In 1682, Daniel Leeds joined the local assembly. He also held the title of surveyor general. In the 1690s he surveyed and acquired land in the Great Egg Harbor near the Atlantic coast. He handed this property down to his sons as a family seat, and it came to be known as Leeds Point: the location most associated with the Jersey Devil legend.

The Leeds Almanac

Daniel Leeds began publishing an almanac in 1687. It was printed by the Englishman William Bradford (1663–1752), one of colonial America's first printers. Leeds's astrological data did not please all his readers. Several members of the Quaker Meeting complained that Leeds had used inappropriate language and astrological symbols and names that were a little too "pagan." The notion of predicting the movements of the heavens did not sit well with Quaker theology. He went to the next meeting and publically apologized. To his surprise an order was sent out to collect up all the copies of the almanac not in circulation and destroy them. Daniel Leeds determined privately to break with the Friends and continue his almanac.

Brimming with the need to get his ideas out and a growing resentment of his fellow Quakers, Leeds put together a book called *The Temple of Wisdom* (1688). Leeds paraphrased and outright copied large sections of other authors to cobble together a personal cosmology. He included sections on angels, natural magic, astrology, and the behavior of devils. The source he drew upon most was the work of the German mystic Jacob Boehme (1575–1624) whose first book, *Aurora* (1612), was considered heretical. Boehme's writings focused upon the nature of sin and redemption. Leeds saw Boehme as a kindred spirit: a self-taught man who, like himself, had experienced ecstatic visions, been called before religious authorities for his work, and rebelled against the establishment. Defending his astrological writings using Boehme's words, Leeds said, "Everyone that will speak or teach of


AN ALMANACK

By Daniel Leeds, Student in Agriculture.

Daniel Leeds first published his almanac in 1687. His astrological material so outraged his Quaker neighbors they tried to have it burned.

divine mysteries, that we have the spirit of God."

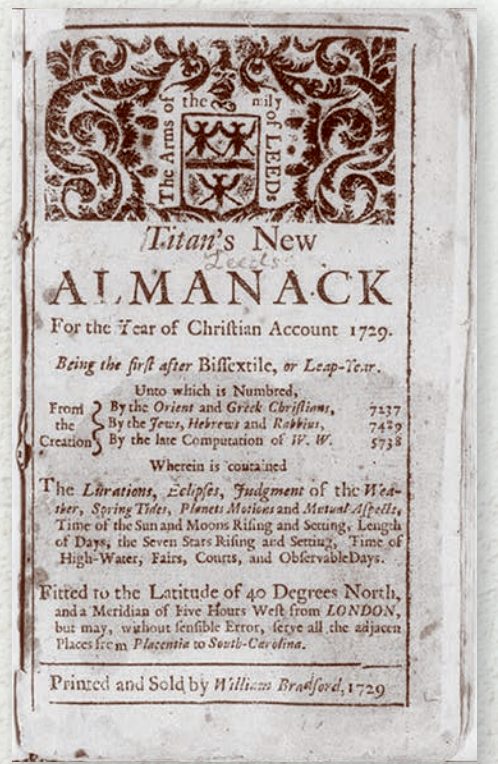
Taken in the aggregate the published work of Daniel Leeds shows him to be a Christian occultist. He was no dark magician though. He used astrology to gain deeper insight into the workings of God and the meaning of Christianity. The readers of his work would have been unfamiliar with the esoteric nature of his writings, so they saw more occultist than Christian in him. The Quaker Philadelphia Meeting immediately suppressed the Leeds book. Now at odds with the Friends, Leeds produced the first in a line of outright anti-Quaker tracts, *The Innocent Vindicated from the Falsehoods and Slanders of Certain Certificates* (1695). Leeds argued that Quaker theology denied the divinity of Christ, and he accused Quakers of being antimonarchists. He left the Quakers in part because, he said, "They formerly exclaimed against the government of England."

Leeds was heavily invested in local politics, leaning toward royal authority. In one instance Leeds advised Lord Cornbury to not swear in several members appointed to the assembly by local election. The rest of the assembly complained to Cornbury about these "groundless accusations" but to no avail. The Quakers saw the Anglican Governor Cornbury as a local tyrant representing the larger empire who sought to keep them under control and who opposed their religion. When Daniel Leeds, as one of their own, sided with Cornbury the Quakers saw him as a turncoat. Leeds also backed other anti-Quakers such as George Keith (1638–1716), an early member of the Society of Friends who knew founder George Fox and William Penn and who soured on the Friends and began preaching that the Quakers had strayed too far for proper Christianity. Keith was disowned by the London Friends and eventually converted to Anglicanism, as did Daniel Leeds.

After a series of Leeds's anti-Quaker pamphlets such as *The Trumpet Sounded Out of the Wilderness of America* (1699), George Fox, the founder of Quakerism, responded to Leeds's accusations with *The Case Put and Decided* (1699) in which he argued that Quakerism stood unjustly accused of any theological wrongdoing. Leeds was also accused by the Burlington Meeting of being "evil." Another defense of Quakerism appeared as *Satan's Harbinger Encountered … Being Something by Way of Answer to Daniel Leeds* (1700). With this pamphlet Leeds stood publically accused of working for the devil.

Daniel Leeds continued to publish his almanac and quarrel with the Quakers until 1716 when he retired and turned the business over to his son Titan Leeds (1699–1738). In 1728, Titan redesigned the masthead to include the Leeds family crest, which contained three figures on a shield. Dragon-like with a fearsome face, clawed feet, and bat-like wings, the figures, known as wyverns, are suspiciously reminiscent of the later descriptions of the Jersey Devil. Titan Leeds then found himself in one of the most notorious almanac feuds of them all. The up and coming Philadelphia printer—and soon-to-be Founding Father—Benjamin Franklin entered the almanac game in 1732 with *Poor Richard's Almanac*. As competitors in a lucrative market, the upstart Franklin decided to go after his established rival to boost sales. In the 1733 edition of *Poor Richard's Almanac*, Franklin used astrological techniques to predict that Titan Leeds would die on October 17 of that year.

Franklin approached this "feud" in a humorous vein while Leeds took it seriously. He retaliated in the *Leeds Almanac* by saying that Franklin "has manifest himself a fool and a lyar [*sic*]"


The Arms of the Family of LEEDS

Titan's New Leeds

ALMANACK

For the Year of Christian Account 1729.

Being the first after Bissextile, *or Leap-Year.*

Unto which is Numbred,

From the Creation { By the *Orient* and *Greek Christians*, 7237 / By the *Jews, Hebrews* and *Rabbins*, 7429 / By the late Computation of *W. W.* 5738

Wherein is contained

The *Lunations, Eclipses, Judgment* of the *Weather, Spring Tides, Planets Motions* and *Mutual Aspects*, Time of the Sun and Moons Rising and Setting, Length of Days, the Seven Stars Rising and Setting, Time of High-Water, Fairs, Courts, and Observable Days.

Fitted to the Latitude of 40 Degrees North, and a Meridian of Five Hours West from *LONDON*, but may, without sensible Error, serve all the adjacent Places from *Placentia* to *South-Carolina*.

Printed and Sold by *William Bradford*, 1729

Having taken over from his father to publish the almanac, Titan Leeds added the family crest which contained a creature not unlike later descriptions of the Jersey Devil.

In 1728, Titan redesigned the masthead to include the Leeds family crest, which contained three figures on a shield. Dragon-like with a fearsome face, clawed feet, and bat-like wings, the figures, known as wyverns, are suspiciously reminiscent of the later descriptions of the Jersey Devil.

for his antics. Franklin replied with mock outrage and hurt, saying Leeds was "too well bred to use any man so indecently and so scurrilously," therefore the person saying these things must not be Titan Leeds but a creature from the spirit world. He went on to say that he had "receiv'd much abuse from the ghost of Titan Leeds." Even after Titan Leeds finally died in 1738, Franklin responded to his own creation that "Honest Titan, deceased, was raised [from the dead] and made to abuse his old friend [Franklin]." Largely out of fun, Benjamin Franklin had publically cast his rival almanac publisher as a ghost, brought back from the great beyond to haunt his enemies. It is interesting to note that the traditionally believed period of the "birth" of the Jersey Devil (the mid-1730s) coincides with the death of Titan Leeds.

Images of creatures similar to the Jersey Devil were already being published in political and satirical pamphlets in the 1640s. This one from England was startling and well known.

Titan stood accused by Benjamin Franklin of being a ghost and of having been resurrected from the grave. The family crest had winged dragons on it. In a time when thoughts of independence were being born, these issues made the Leeds family political and religious monsters.

The Jersey Devil

The Pine Barrens, that area of New Jersey with its thick and seemingly impenetrable forests, dark and forbidding in the heat of summer, mysterious yet beautiful in the snows of winter, so unlike the industrial, urban blight most associated with the state, make a fine place for the birth of a monster. During the pre-Revolutionary period, the Leeds family, who called the Pine Barrens home, soured its relationship with the Quaker majority. The Leeds almanac was seen as inappropriate while his *Temple of Wisdom* bordered on the heretical, and he was publically accused of being Satan's harbinger. His other writings such as *The Trumpet Sounded* attacked Quakerism and its founder George Fox directly. The Quakers saw no hurry to give their former fellow religionist an easy time in circles of gossip. His wives had all died, as had several children. His son Titan stood accused by Benjamin Franklin of being a ghost and of having been resurrected from the grave. The family crest had winged dragons on it. In a time when thoughts of independence were being born, these issues made the Leeds family political and religious monsters. From all this over time the legend of the Leeds Devil was born. References to the Jersey Devil do not appear in newspapers or other printed material until the twentieth century. The first major flap came in 1909. It is from these sightings that the popular image of the creature—batlike wings, horse head, claws, and general air of a dragon—became standardized.

The elements that led to the creation of the Jersey Devil are by and large unknown even to monster aficionados. The Quaker rivalries, the almanac wars, Daniel Leeds and his son Titan, as well as their monstrous family crest drifted into the mists of time, leaving only the vague notion of a frightening denizen of the Pine Barrens. Even the Leeds Devil was all but forgotten, its fragile memory remodeled into the cartoonish "Jersey Devil" while Mother Leeds, as much a phantom as her supposed offspring, materialized out of the forests of Leeds Point. In the twenty-first century, as rubes search the woods off the Jersey Turnpike and the Garden State Parkway for a bat-winged beast, the ghosts of Daniel Leeds and his family may just be watching and smiling at the absurdity of it all. ■

Brian Regal teaches the history of science at Kean University, New Jersey. His latest book is *Searching for Sasquatch: Crackpots, Eggheads and Cryptozoology* (Palgrave, 2011).

Where Is the Science in Electronic Voice Phenomena?

EVERETT A. THEMER

It is hard to turn on the television today without coming across a program about ghosts and the paranormal. These shows might shine an entertaining light on the unknown, but they are often more about their cast of characters and investigators than the science of parapsychology.

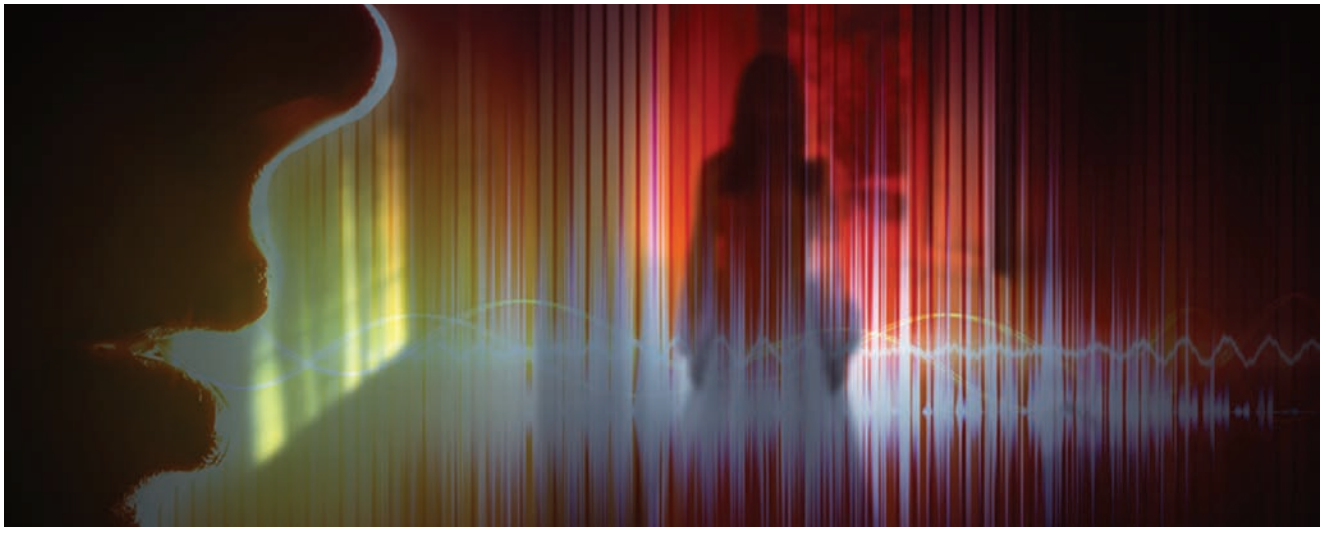
Since the 1920s, when Thomas Edison hinted that he might have attempted to build a "ghost machine" to communicate with the dead, some have tried to apply a scientific method to proving the existence of life after death. So far this has been unsuccessful, and to this day every group of investigators, both amateur and professional, has their own set of protocols as to what is or is not considered paranormal (see Sharon Hill's "Amateur Paranormal Research and Investigation Groups Doing 'Sciencey' Things," SI, March/April 2012).

With no universally accepted methods of investigating the paranormal, the beliefs of investigators can greatly influence the outcomes of their own investigations. Some investigators believe removing objects from a location will end a possible haunting. Others use objects to capture spirits, and psychic investigators believe spirits can be blessed or cast away. None of these methods have been scientifically proven, yet every investigator claims that the method they use is successful.

In pursuit of scientifically verifiable evidence, tools of all types have been employed. Many theories about detecting paranormal activity have been tested using everything from dowsing rods to Geiger counters. While the evidence they provide is scientifically debated, some tools such as audio recorders have become popular mainstays of the paranormal investigator.

The art of recording EVPs, or electronic voice phenomena, is one of the most widely accepted methods of collecting evidence. Originally, a portable tape recorder was used to record an investigator asking a series of questions and waiting for responses in the silence following each question. After the EVP session, the tape was played back and investigators listened for intelligent and relevant responses caught on the tape but not audible to the ear at the time. The theory is that spirits do not have enough energy to create sounds audible to the human ear but can leave impressions on the tape.

As technology advanced, digital recorders replaced tape recorders, and investigators began processing the recordings through computer programs and filters. Using these filters, background noise could be eliminated and frequencies isolated. Hypothetically this made it easier to hear the spirit voices. Lacking any scientific protocol, some investigators began manipulating the speed of the



recordings. Their belief is that ghosts exist on a different dimensional plane than the living and would communicate in a different frequency range. In their opinion this means that the recordings need to be sped up or slowed down to hear any responses.

Some investigators began processing their recordings so much that to an independent listener it might be impossible to tell the difference between a response and ambient noise manipulated and processed into sounding like intelligent communication. At the other end of the EVP spectrum are recordings of investigators asking questions and the responses that they get are so obvious and clear without any processing that the recordings are either intentional hoaxes or definitive proof of life after death.

In its current form, the recording of electronic voice phenomena is more of an art than a science. With no accepted protocols, results are often vague and left to personal interpretation. Why would some spirits communicate on different frequencies and at different speeds while other spirits are able to give a response that sounds almost as if they are standing in front of the recorder? Scientifically it stands to reason that spirits would respond one way or the other and that method would be universal within the spirit world.

What happens after we die may be an unanswerable question, but as the interest in parapsychology grows it is time for both believers and skeptics to look at the field and begin to adapt some universal protocols for its study. Until these are created, real evidence and data are going to get lost in a soup of frauds, natural phenomena, and poor science. ■

Everett A. Themer is an audio engineer and copywriter for a Midwestern marketing company. He used to be an active researcher into paranormal concepts until he became tired of people going into it proclaiming that they intended to be science-based but in reality just wanting to find activity they could claim as paranormal.

Psychic Successes or Memory Failures?

THEODORE E. PARKS

You randomly encounter an old friend you have not seen in years. "That's weird," you think, "I was just thinking about him *and I never do that.*" It's hard for you to accept all this as a mere coincidence—to resist the feeling that somehow, somewhere, deep in your subconscious you knew beforehand that you were going to meet. Precognition exists!

Well, not so fast. Research undertaken by my undergraduate students and me (Parks 1999) suggests, indirectly, that you may be the victim of an illusion: your belief that you hadn't thought about that person in years may be *false*. To see why requires a bit of background.

A Side Trip

I say "indirectly" because at the time of our research, my students and I were interested in what would seem to be a very different question—but one that would also be of interest to skeptics—to wit, why are people (including, tragically, people serving on juries) so willing to believe in "recovered" memories? Our hunch was that hearing such testimony from a supposed victim may remind us of a time when we recalled something in our own lives *along with* the impression that we hadn't thought about that event or thing in a very long time, if ever.

Why are people (including, tragically, people serving on juries) so willing to believe in "recovered" memories?

But, we wondered, what if that memory was never actually hidden or even dormant? What if, in fact, we had actually recalled that event or thing before, but now had simply forgotten doing so? In other words, maybe people are a good deal less than perfect at, in our terms, "recalling recalling."

To find out we decided upon a two-phase experiment. In the first phase we asked people various questions of the form, "Do you recall ____?" (your favorite game, first date, etc.). Our purpose here was to trigger the recall of at least two childhood events (see below). At any rate, after going through a list of twenty such questions, we asked each of our subjects a second, individually tailored, set of twenty questions of the form, "When was the last time you recalled ____?"

Clearly, our ability to recall recalling is strikingly poor. Taken to an extreme, it may happen that there are facts of our lives that we recall "for the first time" over and over again!

The important thing about this second list was that, while most of these questions involved topics that had *not* been mentioned in the first set of questions, two of them *repeated* a topic to which that person had responded "Yes (I do recall that)" when asked about it before. In other words, by tailoring part of the second list to each person's responses to the first list, we were (unbeknown to the subjects) asking how recently they had recalled two things which *we knew* they had recalled just a few minutes ago.

Their responses to those two items might surprise you: Despite the fact that a correct response to a repeated topic would have been "A few minutes ago" or "Just now during the experiment" or words to that effect (*and* despite the fact that we were careful to be sure that they understood that such an answer was permissible) over 70 percent of our subjects gave a longer estimate of time-since-recalling to at least one of their two critical items. In fact, these errors were quite large, the mean estimate of time-since-recall being on the order of twenty-five weeks—roughly half a year!

But, of course, the main point is the basic finding that our subjects often failed to recall that they had just now recalled. Clearly, our ability to recall recalling is strikingly poor. Taken to an extreme, it may happen that there are facts of our lives that we recall "for the first time" over and over again! But even short of that, we should be at least skeptical about the validity of any impression that we have never before recalled some particular fact—of the impression, however strong, that "recovery" of a *long lost* memory has occurred.

Back to Your Meeting

At the same time, our results provide the basis for an alternative, non-paranormal understanding of what seemed to be an astonishing coincidence: meeting a long-lost friend soon after thinking about him. Of course, the key element that makes that coincidence astounding—what gives it the "wow factor"—is your belief that you had not thought about him often before. After all, if you actually had thought of that person fairly often, the probability of your running into him soon after thinking about him increases dramatically.

And our findings suggest that, without your knowing it, such a series may, indeed, have occurred; you may have recalled your friend many times *without remembering* that you did!

If so, then the really impressive element of coincidence here is the fact that your meeting took place *soon enough* after one such recall that the memory of that experience could still be retrieved—you *were* able to remember thinking about your friend. But even with this restriction, if you recalled your friend fairly often, the coincidence involved here would be much less striking—much less improbable—than the one you rejected at the time.[1]

Precognition?

So, there was a coincidence, but maybe *not* one that is extraordinary enough to call for an extraordinary—much less a paranormal—explanation. ■

Note

1. And such a coincidence—meeting him "soon enough" after recalling him—is made even more likely by the additional fact that the time period during which retrieval could be achieved was extended by the *actual presence* of your friend (which would have been a strong aid to retrieval).

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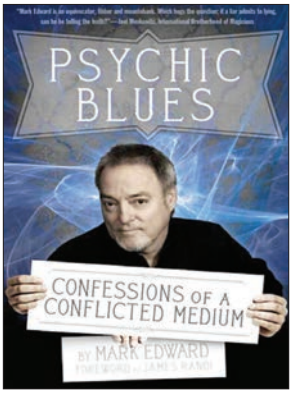
An Inside Look at a 'Psychic's' World

RAY HYMAN



Psychic Blues: Confessions of a Conflicted Medium. **By Mark Edward.** Feral House, Port Townsend, WA, 2012. ISBN 978-1-936239-27-6. 220 pp. Softcover, $18.95

Every skeptic will want to read this book. It provides a rare and insightful view of a self-proclaimed psychic's world. Mark Edward, like many youngsters, began performing magic tricks in his early youth. He graduated to conducting séances at Hollywood's famous Magic Castle. Perhaps, as a result of performing these séances, Edward decided that standard magic lacked the mystery and appeal of mentalism and mediumship. He dropped doing magic tricks and marketed himself as a psychic and a medium. This book provides fascinating, and often depressing, descriptions of his experiences during twenty-five years as a professional psychic.

Edward's career includes a decade working as a 900-number psychic for the Psychic Friends Network. He also worked other venues, including stints as a radio psychic, a spiritualist medium, doing private readings, and providing readings at parties for Hollywood celebrities.

Edward either possesses an impressive memory or he took prolific notes from all his encounters. He provides detailed, often verbatim, reports of his clients' concerns and his responses to those concerns. From his vivid descriptions of his exchanges with callers to the Psychic Friends Network, we realize how pathetic and desperate many of the callers were. Many callers were asking Edward if he could tell them if their boyfriend would return. Typically, the boyfriend had beaten them, even in one case gouging out his girlfriend's eye. Yet, the caller was hoping that Edward would offer her hope that the boyfriend would return. Other callers were contemplating suicide.

Edward currently occupies an ambiguous role in the skeptical community. He is quite active in helping skeptical groups test psychic claims and debunk obviously phony psychics who exploit their clients. At the same time, Edward still performs as a "psychic."

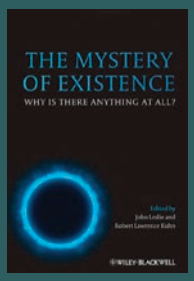
Edward is aware that he is dealing with clients who obviously require the help of professional psychologists or psychiatrists. Like many other professional "psychics" I have known, he apparently justifies his attempts to advise his clients with the belief that these people do not have access to professional help. Unlike other "psychics," Edward takes pride in the fact that he refuses to provide advice on certain legal or medical matters. When his client begins talking about suicide or other delicate matters, he refers them to suicide hotlines or agencies that provide help or advice on such matters. Edward seems to take pride in the fact that he avoids telling his clients what they want to hear. Instead, he says, he tells them what they need to hear.

My colleagues who are clinical psychologists or psychiatrists might question how well Edward may be qualified to know what his clients need to hear. To support his position, Edward quotes from a letter from a woman named Ginger. When Ginger originally phoned Edward, "she had a loaded gun to her head and was ready to pull the trigger." After talking with Edward, she put the gun down "and has since turned her whole life around for the better…" The problem is that this is one of the very few cases in which we know an outcome. Over the many years of answering queries from callers, we

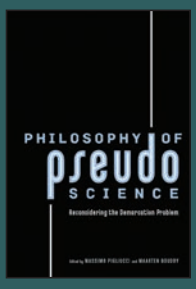
[NEW AND NOTABLE

Listing does not preclude future review.

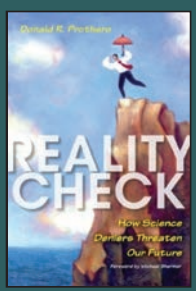
BOOTSTRAP GEOLOGIST: My Life in Science. Gene Shinn. Geologist and occasional SKEPTICAL INQUIRER contributor Shinn recounts his interesting career in marine geology, including some examples of pseudoscience such as his debunking of the so-called "Bimini Road" evidence for Atlantis. University Press of Florida, 2013, 296 pp., $34.95.



THE MYSTERY OF EXISTENCE: Why Is There Anything At All? Edited by John Leslie and Robert Lawrence Kuhn. A philosopher (University of Guelph) and a public intellectual and host of the long-running PBS series on science and philosophy *Closer to the Truth* assemble readings from Plato to the present (by a number of eminent scientists and thinkers) on the question of the title and subtitle and all ramifications thereof (including the question "Why Ask Why?"). Wiley-Blackwell, 2013, 314 pp., $29.95.



PHILOSOPHY OF PSEUDOSCIENCE: Reconsidering the Demarcation Problem. Edited by Massimo Pigliucci and Maarten Boudry. The editors argue convincingly that the nature of science and the difference between science and pseudoscience are topics of crucial interest for philosophers, historians, and sociologists of science and also intrinsically interesting and directly relevant to people's lives. They present twenty-four essays by prominent and original thinkers on the subject to help "bring some order to a large, complex, and inherently interdisciplinary field." University of Chicago Press, 2013, 469 pp., $35, £24.50.



REALITY CHECK: How Science Deniers Threaten Our Future. Donald Prothero. Prothero, emeritus professor of geology at Occidental College and coauthor (with Daniel Loxton) of several skeptical books, including *Abominable Science!* (reviewed in this issue on p. 59), takes a close look at science denial in various forums, including evolution, HIV as a cause of AIDS, and anthropogenic global warming, arguing that science deniers pose a serious and genuine threat to society. Indiana University Press, 2013. 368 pp., $35.00.

THINK: Why You Should Question Everything. Guy P. Harrison. The author of *50 Popular Beliefs People Think Are True* challenges us to think critically and understand the wisdom of questioning the "infinite number of weird claims, unusual ideas, dangerous ideas, and unlikely-to-be-true beliefs stalking you every day." Organized into five lively sections: Standing Tall on a Fantasy-Prone Planet, Pay a Visit to the Strange Thing Living in Your Head, A Thinkers Guide to Unusual Claims and Beliefs, The Proper Care and Feeding of a Thinking Machine, and So Little to Lose and a Universe to Gain. Prometheus Books, 2013, 170 pp., $16.95.

—Kendrick Frazier and Benjamin Radford

have no idea how the advice from Edward made a difference. So it is an open question of whether a caller's interaction with Edward made any difference—positive or negative—in the client's life.

Arguably, many of Edward's other interactions with clients may be more benign. This might especially be so when he is giving readings at private celebrity parties. However, even when doing readings for "fun"—and I confess to having done many such readings over a number of years—the clients often do take the readings seriously. My guess is that most such readings are harmless. But, as I said, this is just a guess. Edward takes pride in making sure he is doing no harm. However, it is fair to point out that we just have no way to know.

Edward currently occupies an ambiguous role in the skeptical community. He is quite active in helping skeptical groups test psychic claims and debunk obviously phony psychics who exploit their clients. At the same time, Edward still performs as a "psychic." He does not claim to have psychic powers. On the other hand, he does not openly disclaim such powers. He leaves it up to the client to decide if the reading is based on paranormal powers. This position is controversial with other skeptics who come from a magical background. They insist that Edward should openly tell his clients that his readings have no paranormal basis; to do otherwise is to behave unethically.

Edward, on the other hand, insists that he sees himself as a performance artist. If he openly told his clients that what he does is a fraud, it would deprive the reading of its mystique.

Because it provides us a rare insight into a psychic's world, as well as raising some important ethical issues for skeptics to ponder, I highly recommend every skeptic carefully read and ponder this book's contents.

Ray Hyman is professor emeritus of psychology at the University of Oregon. He is also a member of the Executive Council of the Committee for Skeptical Inquiry.

Scholarly Cryptozoology: Now, There's Something You Don't See Every Day

SHARON HILL

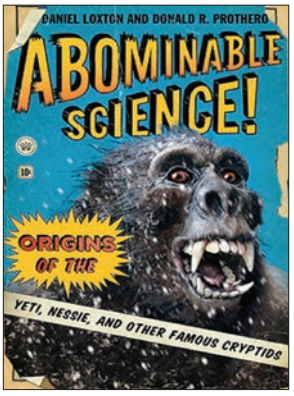
I heard the first teasers about *Abominable Science!* over a year ago. A volume by scientist Donald Prothero and passionate researcher Daniel Loxton on cryptozoology as a science? This was going to be a different kind of book, one that was sorely needed.

When I received my review copy, I noted on social media that I was seriously impressed with the first two chapters. This elicited a strange reaction from two of my online acquaintances who lean to the "Bigfoot believer" side. "Is this another debunking book?" they asked. "Do they attack the Patterson-Gimlin film like the others?"

Behind those questions, I heard expressions of dread and annoyance. Those who are invested in the reality of Bigfoot do not take kindly to scholarly skeptical literature about their pet subjects. Why? Because it demolishes their work. They will not like this book. It is too good. It is well-referenced. It is solid. It is damning.

There are only a few truly stellar cryptozoology books that are worth referring to general readers and seasoned followers of the subject. Along with David Daegling's *Bigfoot Exposed* and Benjamin Radford's *Tracking the Chupacabra*, *Abominable Science!* takes its place upon the must-have list for cryptid researchers.

There is a chasm between the scholarship done by several skeptical researchers, such as Prothero and Loxton, and that of the pop cryptozoology books full of recycled stories, propagated errors, and rampant speculation. *Abominable Science!* is not one of those mass marketed mystery mongering books. It's a definitive volume.



Abominable Science! Origins of the Yeti, Nessie, and Other Famous Cryptids. **By Daniel Loxton and Donald R. Prothero.** Columbia University Press, New York, 2013. ISBN: 9780231153201. 424 pp. Hardcover, $29.95

The most profound take away from this book is that our monsters are created, not found.

Both authors, like almost all cryptid researchers, dearly wish for these creatures to really be out there. They love the subject. If they didn't, this book would not be the model of careful referencing and curating that it is. There is a love of finding out that is self-evident in these pages. If one reads this exposé as debunking, it is only because there is bunk to be called out. And there is plenty.

Instead of exploring the folklore origins of the creatures in question (Bigfoot, Nessie, Mokele Mbembe, and others) the authors go to the *original* written sources, as early as can be found, to determine when they appeared and how the story developed. There are some stunning surprises here for those who are not intimately familiar with the famous "Surgeon's photo" at Loch Ness and the antecedent of the iconic Patterson-Gimlin film in which we see a detail for detail match. It is more than a little suspicious and should cause serious cryptid researchers to pause and reassess their assumptions.

We discover that a few key people—often, it is one individual per cryptid—were responsible for its entire genesis. Our hopes and encouragement from the media were responsible for their proliferation and sometimes their rebirth and second proliferation such as what is currently happening with monsters like Bigfoot.

The most profound take away from this book is that our monsters are created, not found. A feedback loop exists in modern film that creates and propagates the monsters we love. Current self-appointed cryptozoologists

will find this difficult to accept. With its extensive citations, awesome book jacket, thick and glossy pages, and lovely illustrations throughout including many originals, this book was many years worth of meticulous work. It is a greatly commendable piece of scholarship not in biology but in folklore. Humans tell stories; humans interpret the world around them as they see fit. That is different from what actually is. We need to understand this in order to ask the right questions and get to the best answer.

If you call yourself a cryptozoology researcher, you must consider and confront the problems that arise in your subject area, its history, and the existing evidence for or against viability of these mystery creatures. This book illustrates that science evolves, yet cryptozoology has not. We have no Bigfoot, no Nessie, no Yeti. None of these iconic monsters have been found, nor do we have any reliable knowledge about them. The field has changed in flavor since the inception of the Internet. These days, cryptozoology is sour. The problems are not seriously considered but brushed aside. The evidence for cryptozoology is floppy. It can't stand without being propped up by rampant speculation and a quasi-religious (or sometimes outright religious) zeal.

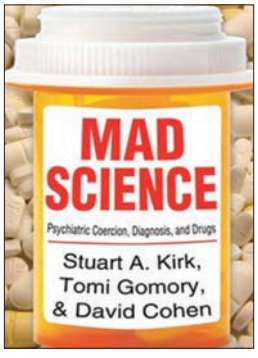
Abominable Science! is a sharp sword that cuts through the bogusness of popular monsterology. It is thrilling to see this. I can only hope that researchers of these topics—the *Finding Bigfoot* show people, the amateur researchers, the popular authors of monster volumes, the paranormal proponents online—will actually read it and absorb the many critical lessons it delivers.

Sharon Hill is a geologist and policy specialist who also researches and writes on topics relating to the paranormal, pseudoscience, cryptozoology, anomalous natural phenomena, and skepticism. She has a master's degree in education, specializing in science and the public, and runs the popular critical thinking newsblog *Doubtful News* (http://doubtfulnews.com).

A Serious Look at Psychiatry's Madness Model

PETER BARGLOW

Mad Science: Psychiatric Coercion, Diagnosis, and Drugs by Stuart A. Kirk, Tomi Gomory, and David Cohen comprehensively evaluates psychiatry's own evidence for its disease model and its justification for its treatment of mental illness. It attains this goal better than all prior efforts to discredit psychiatry. The authors' basic intellectual framework is social work and welfare, sociology, and public affairs, and I think they would like to distance their fields from psychiatric-medical hegemony. The book's major claims I'll discuss only with regard to schizophrenia, the single most severe and researched condition of psychiatry.



***Mad Science: Psychiatric Coercion, Diagnosis, and Drugs*. By Stuart A. Kirk, Tomi Gomory, and David Cohen.** Transaction Publishers, New Brunswick, USA and London UK, 2013. ISBN: 1412849764 . 346 pp. Hardcover, $39.95.

The first claim (with which I agree) maintains that psychiatry's illness classifications (*The Diagnostic and Statistical Manual of Mental Disorders*, or DSM, versions I-V) are incompetent and insufficient. However, the DSMs aim only at reliability and clinical description, not validity. As a consequence the DSM volumes currently pay little attention to biomarkers capable of distinguishing between major disorders. Tom Insel, chief of the National Institute of Mental Health, also criticizes psychiatric nosology for failing this scientific requirement.

A second claim I also accept is that proof of benefit for medications is vastly exaggerated or even falsified by psychiatrists. Distortions of research are driven by a profitable drug industry that floods populations identified as medically ill with agents that have as many deleterious side effects as benefits. Two of the authors, Gomory and Cohen (2010), aptly named this gigantic influence the "Biomedical Industrial Complex."

A third major claim convicts psychiatry of excess coercion in treatment practices such as somatic

therapies and involuntary hospitalization. Yes, overused shock treatments (ECTs) and aversive conditioning methods were prominent in World War I in Germany, France, and England and present in the USA during World War II. But their use has dwindled during the last half century. The accusation that today's psychiatry is excessively coercive in promoting involuntary hospitalization may be somewhat justified, but it requires cautious consideration of several variables minimized by the authors. The values and practices of U.S. psychiatrists and psychologists mirror the regional legal, cultural, and political values of America regarding involuntary methods of treatment. There is a lively current debate about whether severely disturbed patients were better off in the warehouses of state hospitals or in the U.S. prison system. Failures to give humane care in both settings originate in funding and political priorities, but perhaps the psychiatric profession has not resisted these forces strongly enough.

In northern California, judges today who routinely lead hearings about whether a patient should be forced to remain in a psychiatric facility more than the seventy-two hours mandated by law (designated a "5150" process) lean heavily toward protection of civil liberties even of potentially violent patients. Between 1936 and 1955 psychiatry adopted the intervention of frontal lobotomy for the profoundly mentally ill, with the consequence that 50,000 such barbaric operations were performed in America. But fifteen years later, representatives of the American Psychiatric Association loudly protested politically motivated incarceration of dissidents as mental patients during the Chinese cultural revolution of 1966–1976. In 2002, California passed "Laura's Law" (Assembly Bill 1421) mandating court-ordered sustained and intensive treatment by a treatment team, housing, and perhaps anti-psychotic agents. But it has been implemented by just two of the state's fifty-eight counties, Nevada and Yolo Counties. To return to the other side, could we not predict that during the immediate months following the Sandy Hook, Connecticut, school and Aurora, Colorado, theater massacres, psychiatrists (echoing the public outrage) would demand lower standards for involuntary hospitalization?

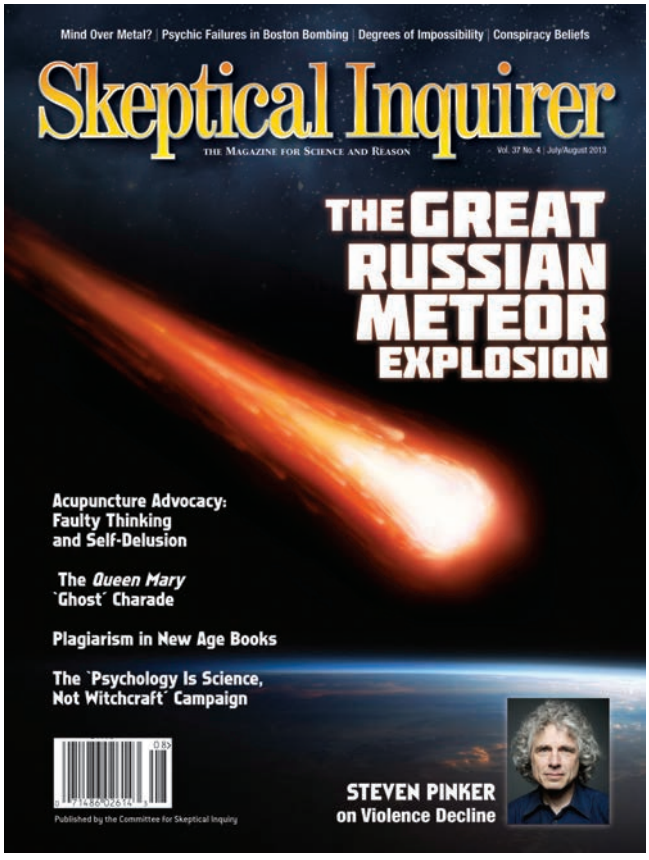
If small simple organs like the pancreas, the kidney, or even the tiny thumb can have a disease, why can't the human brain with its 86 billion neurons be likewise afflicted?

I disagree vehemently with the book's fourth major claim—that no evidence verifies that insanity is a medical disease. The authors quote DSM IV's admission that there is a paucity of laboratory findings proving a schizophrenic diagnosis, but they ignore the immediately following citation of consistent brain abnormalities in size of the brain's ventricular system, cerebrum, and hippocampus. During 2012, good statistical evidence emerged demonstrating 50 to 100 genetic loci to be associated with schizophrenia. According to *Mad Science*, "Delusional Disorder" is not a disease but identifies a "person with incredible, scary beliefs" (p. 322). Is a person's refractory conviction that a stranger has replaced his internal organs with another person's entrails without leaving a wound or scar merely an odd fantasy? Their book includes an extensive review of the verdict of the world's finest medical historians about this question. Almost all of them implicate the human brain. For example, the late Roy Porter concluded that mental disorders are "complex and distorted reflections of dysfunctional brain sites and states" (p. 63).

On the other side of the debate, Thomas Szasz, an eloquent zealot, denounced the dehumanization in our diagnosing disease and championed the concept of the "myth of mental illness." (The authors of the book don't mention that their admired witness had an earnest flirtation with pseudoscientific Scientology.) If small simple organs like the pancreas, the kidney, or even the tiny thumb can have a disease, why can't the human brain with its 86 billion neurons be likewise afflicted? Yes, it is dismaying that we can't yet understand their failures in integration that produce disease. But we also still await knowledge about the etiology of most fatal cancers.

The only weak section of this otherwise persuasive and serious book is its offering of potential alternatives to the current U.S. system of medicalization of mental "mad" conditions. The authors consistently regard these as representing "personally perceived *distress*" or deviant, uncooperative, morally offensive, or displaying socially disruptive *misbehavior*. Such variations of "normal human experience," the authors suggest, can be managed without involuntary confinement through skilled communication and ample emotional support. The book maintains that involuntary treatments are ineffective anyway in preventing homicide and suicide. It proposes that expert prescription privileges should be abolished and replaced by consumer reviews of psychoactive medications. Medicines might then be chosen without persons being stigmatized by the term, "psychiatric patient." For this reviewer such a "libertarian" approach is anarchic enough to make him uneasy. ■

Peter Barglow, MD, is clinical professor of medicine and psychiatry at UC Davis and a psychiatrist member of the American Psychiatric Association. He wrote about deficiencies of the PTSD diagnosis in our May/June 2012 issue.


Mind Over Metal? | Psychic Failures in Boston Bombing | Degrees of Impossibility | Conspiracy Beliefs
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THE MAGAZINE FOR SCIENCE AND REASON
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THE GREAT RUSSIAN METEOR EXPLOSION
Acupuncture Advocacy: Faulty Thinking and Self-Delusion
The Queen Mary 'Ghost' Charade
Plagiarism in New Age Books
The 'Psychology Is Science, Not Witchcraft' Campaign
STEVEN PINKER on Violence Decline
Published by the Committee for Skeptical Inquiry

The Chelyabinsk Meteor Explosion

The photo on the cover of the July/August 2013 Skeptical Inquirer, and the accompanying article ("The Chelyabinsk Event of February 15, 2013"), are but the cake. Please supply the icing! I would love to read more about the actual physics involved in a "space rock" entering Earth's atmosphere: e.g., how gravity can accelerate the object to such high velocities; how friction can generate the high temperature that leads to the half-megaton explosion; what role the composition of the "rock" plays in how the object disintegrates; etc.

John Wyman
Stoney Creek, Ontario
Canada

Coauthor Alan Harris replies:

It's not all the Earth's gravity; cosmic velocities are just very large, essentially a significant fraction of the orbital velocities of planets (or meteoroids) around the sun. The Earth's orbital velocity is 30 km/sec. The "average" speed of small asteroids or meteoroids relative to the Earth (but before the Earth's gravitational field alters the speed) is around 20 km/sec. The Chelyabinsk body was actually a rather "slow" one, with a velocity relative to the Earth of "only" 14 km/sec before "falling" into the Earth's gravity which sped it up only modestly, to around 18 km/sec.

The temperature rise is just a thermodynamic process. As the object rams into the air, a "stagnation layer" of atmosphere envelopes the body. That air is heated as the streaming velocity, 18 km/sec, is converted into random motions (heat) of the molecules. Molecules of air with a mean velocity of 18 km/sec correspond to a temperature of several thousand degrees Celsius. The explosion and half-megaton of energy is not due to the heating. The explosion is caused when the aerodynamic pressure on the body exceeds the strength of the material (rock, in this case), and crushes it. That process is run-away, that is, once it breaks into a few pieces the smaller pieces continue breaking up into still smaller pieces, in a similar way that a smaller rock is easier to break with a hammer than a bigger one. The half megaton of energy is just the kinetic energy of the mass of the rock moving at 18 km/sec. Some of the energy turns into the light and heat of the bolide, some into the sonic boom and aerodynamic shock wave, and some into vaporizing the rock itself.

Different compositions respond to atmospheric entry differently, of course, and in fact that is one way we can know the composition of incoming bodies. If the Chelyabinsk body had been iron, it would likely have made it to the ground in one or a few pieces, as happened with the Sikhote-Alin impact in 1947. If it had been a soft and weak body, like a carbonaceous chondrite, it would have exploded considerably higher than the 23 km altitude where it actually broke up. Since pieces of the body were recovered, and we can measure their strength and density, this event becomes a useful "calibration" of our theoretical models of atmospheric entry of such bodies.

Plagiarism in Vampire Encyclopedia

I always look forward to the book reviews in each issue of Skeptical Inquirer and sometimes buy books based on these reviews. In the July/August issue, I found Benjamin Radford's article about plagiarism in *The Element Encyclopedia of Vampires: An A–Z of the Undead* by Theresa Cheung and published by Harper Collins most interesting. Later in the same issue, I read the book review by Harriet Hall of Dr. Paul Offit's book *Do You Believe in Magic? The Sense and Nonsense of Alternative Medicine* and was on the verge of ordering the book from Amazon when I noticed that it was also published by Harper Collins. While I doubt that it has any real bearing on the authorship of Dr. Offit's own book, it does raise a question about the integrity of a publisher that won't demand the highest standards from its editors. Think I'll pass on any books published by Harper Collins until I see a *mea culpa*.

Jim Phillips
Newcastle, Wyoming

May I suggest that the virtues of Offit's fine book be considered independently of the publisher's shortcomings on the Cheung book. —Editor.

I just read your article about Theresa Cheung in my recent issue of Skeptical Inquirer and was motivated to send the attached email to Harper Collins. Perhaps if they receive an avalanche of other emails expressing the same sentiment they will be prompted to do something.

Dear Sir or Madam,

I have just read the article by Benjamin Radford in *Skeptical Inquirer* magazine (July/August 2013) that exposes the rampant plagiarism of this author in her book *The Element Encyclopedia of Vampires: An A-Z of the Undead.*

I am surprised that you have not withdrawn this book from publication given the large amount of evidence provided by Mr. Radford.

Do you have an intention of doing anything about this or shall I draw this to the attention of other more widely read/watched media that might cause *HarperCollins* greater embarrassment?

Graham Hodge
East Aurora, New York

For those who wish to add their voices, HarperCollins can be reached at HarperCollins Publishers, 10 East 53rd St., New York, NY 10022—Editors.

Conspiracy Beliefs Poll

I am often frustrated when encountering questions in articles discussing poll results that apparently do not ask what the poll writer intended to ask. This has just occurred with question ten of the poll in "Do You Believe That? Poll Zeroes in on Conspiracy Beliefs" reported on in the July/August 2013 SI. This question asks: "Do you believe aliens exist, or not?" Strictly interpreted, as in "Do you believe aliens exist (somewhere in the universe), or not?" my answer would have to be "probably." I support the Planetary Society and its SETI efforts, which presuppose a decent chance of a yes answer to that question.

However, interpreted that way, question ten has nothing to do with conspiracy beliefs, so I doubt that's what the poll writer was really asking. My best guess would be the question they're really asking is something like "Do you believe aliens exist (and are active on Earth, as depicted in the pages of, say, the *National Enquirer*), or not?" The answer is of course, completely different.

If I ever respond to one of these polls, I am going to be really torn on how to respond to a question like this.

John Moore
Arlington, Texas

I was somewhat taken aback to see, among fifteen questions where the "yes, I believe that" response was typically associated with conspiracy theories, this odd duck: "Q10: Do you believe aliens exist, or not?" which clocked in at 29 percent yes, 47 percent no, and 24 percent not sure.

Surely the reasonable answer—given a universe of 400 billion galaxies, each with around 400 billion stars, most of them with several planets, and 14.5 billion years in which intelligent life might possibly arise on at least one (other) of them—is "yes, the odds certainly favor it."

The unreasonable (i.e., conspiracy-based magical thinking) answer would be "no, God wasted all that time, energy, material, effort, and creativity just for wonderful us, nobody else, and we are the center and purpose of it all, the gem of all creation".

Notice that the question didn't ask "Do you *know* aliens exist?" or "Do you think aliens exist *among us*?" but only whether we *believe* aliens exist somewhere, and I honestly do, even though I don't have a shred of evidence for it, just my sense of the probabilities involved. Does that make me a conspiracy theorist? It appears that the Public Policy Polling people think it does. I believe they should rethink their interpretation.

Richard S. Russell
Madison, Wisconsin

For skepticism to maintain its own credibility, care must be taken to avoid any whiff of agendas or political motivation.

For example, the article "Do you Believe That? Poll Zeroes in on Conspiracy Beliefs" should not be conflating in the same list both fringe propositions ("Do you believe a UFO crashed"), with perfectly plausible ones ("Do you believe the Bush administration intentionally misled the public about WMD?")

To treat the latter as if it were in the "same category" as the former smacks of being a kind of "guilt by association" that would make a fine piece of political propaganda in its own right. The thought that our government institutions might sometimes intentionally mislead the public is not particularly bizarre. It is, if anything, more on the order of a perfectly predictable modus operandi.

Tom Keske
Randolph, Massachusetts

Thanks to all who wrote. This was not our poll, of course. I was just reporting on it. I can't change the questions, some of which I disagreed with too. The question "Do you believe aliens exist?" was indeed very poorly worded. A number of readers objected to it. But overall the poll did reveal some interesting specifics about "conspiracy" beliefs, and I think those were worth reporting. —Editor

Mind Over Metal?

When I read Joe Nickell's "Mind Over Metal" (July/August 2013), I paid particular attention to the comments about Uri Geller. Sometime in the mid-seventies—I wish I could be more specific—Geller was a guest on the Lou Gordon Program on WKBD-TV in Detroit. Commercials for the show promised he would demonstrate his powers.

At the beginning of the interview, Geller and Gordon were seated across from one another at a desk. Gordon held up a large metal bolt and asked Geller to bend it using his mind. (I admit I burst out laughing.) Geller quickly demurred and produced a small spoon and said he would bend it instead.

Geller began to fidget and squirm as though he was sitting on a hotplate. Mindful of misdirection, I concentrated on his hands. As I watched, in fits and starts Geller began to maneuver the spoon toward the edge of the desk, all the time babbling at Gordon. Suddenly, with his right hand he jerked the spoon over the edge of the desk and pressed down on the handle, bending it into a forty-five degree angle. He then held the spoon up in triumph before an astonished and approving Gordon.

I was aghast: not only was Geller a fraud, he wasn't even a *good* fraud. To verify what I had seen, I watched the rebroadcast a couple of days later. The deception was still blatant; but if there was any fallout I never heard about it. I have always wondered if WKBD archived the tape. If so, it would at least be good for laugh; but I remain disgusted with Geller and his defenders.

Gerald Martin
Canton, Michigan

Good Questions!

The July/August Skeptical Inquirer contains many interesting and insightful articles. I was bemused by "British Businessman Sentenced in Bogus 'Bomb Detector' Scam," which notes that the "fake bomb detectors [were] based on $20 golf ball finders bought from the United States." The report left unanswered whether the devices could find golf balls. I would be skeptical. However, perhaps they could be added to the equipment used by UFOlogists to find evidence of UFOs or used by ghost hunters on the *Queen Mary*. Or perhaps their use should be limited to finding golf balls in the *Queen Mary* recreational areas.

David W.E. Briggs
Marion, Massachusetts

The Perpetual Question

Two writers chided Mark Levy for lumping the Dean Drive in with perpetual-motion pseudoscience (Letters, July/August 2013). Strictly speaking, they're right, but I think a machine that violates conservation of momentum is not much different from one that violates conservation of energy. As I recall, the Dean Drive "worked" by vibrating hard, which made it walk along the floor and threw off attempts to weigh it. Suspending it from wires would have provided good evidence one way or the other, but this was never done.

Philip M. Cohen
Cleveland, Ohio

If Ken Moses really did make a working Dean Drive, he could

have refined it (perhaps driven it faster) and made a mint. While it would not be perpetual motion, it would break another fundamental law of physics, Newton's Third Law, generating force without reaction. I suspect Moses actually saw some minor side-effect of any jiggling unbalanced machine, such as the same stick-slip friction that "walks" a washing machine across a laundry. A simple test would be to hang it on wires, directing its thrust sideways. A working Dean Drive would swing out and hang at an angle.

Hugh Young
Porirua, New Zealand

In discussing impossibility ("Mathematical Explanations and Degrees of Impossibility," July/August 2013) Massimo Pigliucci emphatically states that "the U.S. Patent Office long ago stopped even considering applications for [perpetual motion] machines." Pardon, but the statement is "patently" false. Numerous such apparatuses receive patents every year. What the USPTO attempts to not allow is claims that include perpetual motion. Patent 8,397,496 of March 19, 2013, is a recent example of a perpetual motion device that was not only considered but issued as a patent.

James E. White
Okemos, Michigan

Questions on Political Values

Barry Fagin misrepresents us liberals when he says that we emphasize fairness and proportionality over the moral dimension of liberty ("Valuing Science with Different Values," May/June 2013, and response to Letters to Editor, July/August 2013). Speaking as a liberal, and a campaigner for freedom in the computing field, I value both—however, on any given issue, one or the other may apply more strongly: the moral dimension of liberty is paramount in personal noncommercial activities, somewhat applicable to a small personal or family business, and inapplicable to a big business. As a liberal I do not believe that taxation infringes personal liberty, so I judge tax issues based on other values. Fagin has presented his views; I just want to set the record straight about liberals' views.

Dr. Richard Stallman
Cambridge, Massachusetts

I found Barry Fagin's article interesting but somewhat troubling. I've never been able to get a clear understanding about what Libertarianism really is. Reduced government, surely, but to what extent? Lowering restrictions on individual rights, but how much in the way of restriction is allowable?

While the article made some solid points, some statements were equivocal or led to unpleasant implications. He referred to the "evolutionary basis for gender differences" and to "evolutionary psychology" regarding "gender equality," leaving me with the implication that, because of these scientifically documented differences, he feels we should consider women in a different light than men. But this smacks of unacceptable bias. Evolutionary differences may be useful in evaluating groups but not individuals. Group averages are irrelevant; choosing someone for a job, or a team, or a political office must be based on the individual, not the group. . . .

He asks, "What are the rights of psychics and fortunetellers"? Will "certain policy positions" violate these rights? And if the FDA regulates homeopathic medicine "similar to other drugs" is this a good idea? If, as he suggest, we should base public policy on sound science, I don't think psychics and fortunetellers have any rights to pursue their activities. What they do is rooted in fraud and deceit, and harms individuals and the society. The same goes for homeopaths, and their partners in crime: acupuncturists, chiropractors, and all forms of "alternative" medicine, and all the many preachers of quackery who cause society to lose massive amounts in money and health.

Should this increase the role of government, so be it. I like to continue driving my car, but sometimes a government-installed red light deprives me of this right, but I accept it. A primary role of government should be to protect citizens from harm, especially from their own ignorance.

Marvin J. (Chic) Schissel
Roslyn Heights, New York

Voltaire Veracities?

O, the irony! In the *Skeptical Inquirer*! Please tell Keith Taylor (Forum, "Grumble, Grumble," July/August) that Voltaire did not say "I disagree with what you say but I'll defend to your death your right to say it." Something quite like that ("I disapprove of what you say…") appeared in the Voltaire biography by Evelyn Beatrice Hall, but the words were not attributed to Voltaire *soi-même*.

Sandy McCroskey
Brooklyn, New York

Mr. Taylor seems to have violated at least three of his own ten rules on "veracity" of discourse. When he erroneously states that the radio program, *Mr. District Attorney*, appropriated Voltaire's "I disagree with what you say, but I'll defend to the death your right to say it" for a "stirring lead-in" to the broadcast. The correct lead-in was: "And it shall be my duty as District Attorney not only to prosecute to the limit of the law all crimes perpetrated within this County, but to defend with equal vigor the rights and privileges of all its citizens." I may be a word or two off, but I still recollect the distinctive timbre of the "D.A.'s" voice. Mainly I am curious as to whether or not Mr. Taylor will admit to violating number one: "If you don't want your ideas challenged, don't send them to people who (remember), number four: "Don't claim things without proof unless it cannot be disputed" or number ten: "I was wrong."

Robert Jedrzejewski
Tarentum, Pennsylvania

Keith Taylor replies:

Robert Jedrzejewski asked if I was willing to admit I was wrong. Yep, at the age of eighty-three I've been wrong very often. But while a nitpicker might find me wrong in my comment on Mr. District Attorney I'm not worried about it. The attorney and Voltaire agreed and I agree with them.

Dates on Certificates

Further to Ben Radford's column and Mike Brown's letter (July/August 2013) on wrong dates, let me add a note. In 1953, I acquired my first car (a Morris Minor) and a New York State driving license. Some four months later I was waved down by a policeman (I forget why) who asked to see my license. He looked at it briefly, and then burst out laughing, saying that I was only four months old. Apparently the clerk in the license bureau had put the current date in the spot where my birth date belonged.

Robert Stairs
Peterborough, Ontario

The New Atheists

Ian Alterman, in his letter (July/August 2013), along with many others, feels that the "new atheists" are much too strident in their writings. His opinion seems to be that if these writings were just a little more humble, their message might influence a larger audience. If their message was more respectful of the opposing opinion they would influence more people. I have yet to understand how I should respect Exodus 20: 20–21 which says,

"When a man strikes his slave, male or female, with a rod and the slave dies under his hand, he shall be punished. But if the slave survives a day or two, he is not to be punished for *the slave is his money*." (Emphasis mine.) This horrific statement is in Rev. Alterman's holy book, and I would be disrespecting humanity if I did not speak out against such brutal and outrageous commands.

How I wish I would have had a book written by Dawkins, Hitchens, Harris, or Stenger when I was struggling with the pressure put upon me by the conservative Christian community in which I was reared. It took nearly ten years of pain as I struggled with my changing beliefs. Having an ally like Dawkins or Harris would have shortened that struggle by assuring me that I was not alone in my thinking.

My hope is that they keep writing in the future as they have done in the past. Be confident that there is an audience that needs the support.

Garry L. Loucks
Tucson, Arizona

Immanuel Velikovsky

As for Velikovsky (Letters, July/August 2013), back in the early 1970s, Isaac Asimov had an article in *The Magazine of Fantasy and Science Fiction* called "Worlds in Confusion" in which he clearly demonstrated that Velikovsky's goal was to demonstrate that many miracles in the Old Testament had a basis in fact, including the "manna from heaven" dropping on the Hebrews in the desert, which Velikovsky attributed to pieces of a comet falling down. As Asimov noted, Velikovsky failed to explain why the "manna" failed to fall anywhere else and why it would not come down on the Jewish Sabbath. Asimov observed that *Worlds In Collision* came out around the time of the founding of Israel and the book sought to justify historical claims on the part of Jews to "the Holy Land." I personally doubt that Velikovsky took any of his absurd claims seriously; he had a larger political agenda in mind.

Dennis Middlebrooks
Brooklyn, New York

The Null Hypothesis

Paul G. Brown ("Bringing Bayes into Predictions," July/August 2013) misinterprets the meaning of p in his interesting review of *The Signal and the Noise*.

The null hypothesis is always considered to be true. If two groups in a research study are found to differ, and if the selected p value is <.05, then it is said that the difference would occur 5 times out of 100 or, as Mr. Brown writes, 1 in 20. Period. The null hypothesis is therefore rejected but not proven. That the finding is considered unlikely is correct, but the notion "not by chance alone" is not to be applied to the obtained research outcome. Under the null hypothesis, chance is said to be operating 100 percent of the time.

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[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

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SKEPTICAL ANNIVERSARIES

by Tim Farley

November 2, 1963: The American Medical Association creates a Committee on Quackery, beginning a decades-long battle with chiropractic that ended in *Wilk v. AMA* (1987).

November 15, 2003: Gala grand opening was held for the Steve Allen Theater at CFI–West in Los Angeles.

November 18, 1978: Jim Jones led his People's Temple cult in a mass murder-suicide that claimed 918 lives.

November 21, 1953: A detailed *London Times* article definitively exposes Piltdown Man as an "elaborate hoax."

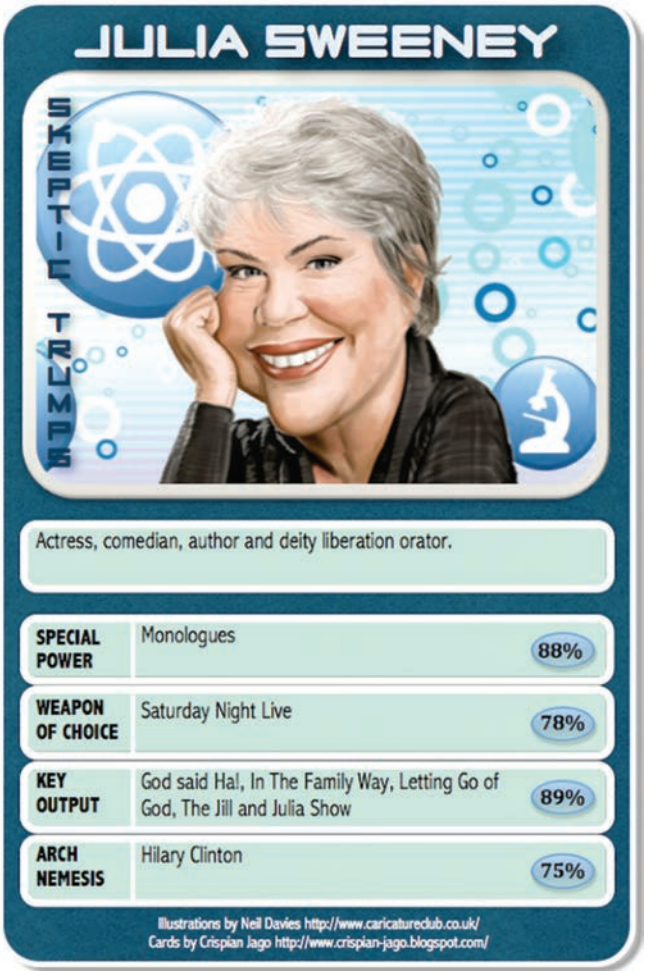
November 22, 1963: The assassination of President John F. Kennedy spawns many conspiracy theories that persist to this day.

December 3, 1923: The long-standing "Frye standard" for admissibility of scientific evidence in U.S. courts is set in the polygraph case *Frye v. U.S.*

December 15, 2003: A fictionalized docu-drama about the (since retracted) Andrew Wakefield MMR study called *Hear the Silence* airs on England's Channel Five.

December 31, 2003: Barbra Streisand's lawsuit against an environmental group—origin of the term "The Streisand Effect"—was dismissed.

Tim Farley is a research fellow with the James Randi Educational Foundation and created the website whatstheharm.net.



MYSTERY SOLVED
I CAN IMAGINE THEIR DISAPPOINTMENT.
DISAPPOINTMENT, INDEED. IMAGINE THE PLIGHT OF THE AMPUTEE!
EX-EXCUSE ME. I THINK THAT MAY BELONG TO ME.
WE GOT THE WRONG LEG
...AND SO THEY CAUGHT HIM AND CHOPPED OFF THE OTHER LEG.
IT, UH, WAS ALSO NOT MAGIC.
IT ALL LEAVES ME STUMPED.
MM, QUITE.
JOIN THE COLONEL NEXT ISSUE FOR ANOTHER MYSTERY SOLVED!
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